

**STRESSFUL EVENTS AND DISTURBED SLEEP:
CORRELATIONAL STUDIES OF RETROSPECTIVE DATA**

Thesis

presented to the Faculty of Arts
of
the University of Zurich

for the degree of Doctor of Philosophy
by
Zdenek Cernovsky
of Canada

Accepted on the Recommendation of
Professor Inge Strauch Ph. D.

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CONTENTS

	PAGE
I Introduction	1
II Theoretical Section	4
1. Definition of basic concepts	4
1.1 Definition of stress	4
1.2 Definitions in the area of sleep disorders	7
1.2.1 Definition of nightmares	8
1.2.2 Definition of insomniac disorders	11
2. Review of literature	16
3. Goals, methods, and hypotheses of the present study	70
3.1 Goals and methods	70
3.2 Hypotheses	87
III Empirical Section	88
1. Study I	88
1.1 Method	88
1.1.1 Subjects	88
1.1.2 Procedure	90
1.2 Results	92
1.3 Conclusions from Study I	114
2. Study II	117
2.1 Method	117
2.1.1 Subjects	117
2.1.2 Procedure	117

2.2	Results	119
2.3	Conclusions from Study II	122
IV	Discussion	124
V	Summary/Abstract	127
VI	References	129
VII	Graphic Data: Figures 1 to 18	149
VIII	Appendix	168

I INTRODUCTION

Many clinicians may be heard to emphasize that waking life events have a formative impact on dream content, and that stressful events are usually followed by an increased incidence of sleep disorders such as insomnia or nightmares. Similar beliefs are a part of clinical lore, i.e., of the array of tools used by the clinician to perceive and interpret intrapersonal and behavioural events. Some support for similar beliefs is offered by unsystematic accounts of high incidence of sleep disorders in persons exposed to severe stress such as war or accidents (Grinker & Spiegel, 1945; Oppenheim, 1889). The content of highly aversive events experienced while awake is frequently re-experienced, in a closely similar manner, on subsequent nights (see Lifton & Olson, 1976). Less traumatic events, however, were assumed by well-known clinicians such as Freud or Jung to be incorporated into dream content in a rather indirect and largely symbolic manner (Freud, 1900, 1916; Jung, 1964). Similar theories are extremely difficult to test in experimental designs. A brief perusal of recent reviews of empirical research in this field is sufficient to convince most readers that the issue whether or how waking life events are incorporated in dreams is far from being resolved (Arkin, Antrobus, Ellman, 1978; Cohen, 1979). Thus, a novice psychotherapist interested in theories of sleep disorders is faced at least with two burning questions: (a) Are reports of

stressful events more frequent in patients who report more sleep disorders, and (b) is an increase in the level of life stress associated with an increase in incidence of sleep disorders?

It may be noted that the two questions deal with radically different topics. The frequency of reports of waking life events or of sleep disorders may be unrelated to their underlying real incidence. Certain clinicians might claim that the answer to both questions is "yes" only because their unsystematic observations in respect to the first question led them to conclude that reports of events and of sleep disorders are related and they assumed that the reports are sufficiently accurate, i.e., not unduly distorted.

However, no statistical data have yet been presented to answer either question with at least a tentative confidence. Therefore, the present study was carried out to gather and analyze data relevant to the first question. Thus, the study deals with relationships of retrospective reports of stressful events to retrospective reports of sleep disorders. Its value lies in the similarity to situations faced by the clinician: The clinician has to make judgements or interpretations based on retrospectively reported data by the clients. Obviously, statistical data are needed to examine to what extent clinical lore overlaps with reality.

An additional goal of the present study was to gather data to closely related theoretical issues such as hypotheses dealing

with relationships of reports of specific types of stressful events to specific types of reported content of nightmares.

The focus of this study is thus entirely on subjective rather than on objective data (the difference in the data is further conceptually emphasized in the next section; see "Definitions of basic concepts"). No conclusions should be drawn in respect to the underlying objective relationships of sleep disorders to stressful events: The methods of the present study are inadequate for this purpose. The present study is meant as a test of clinical speculations (so frequent in current literature) about subjective data and its value is limited to this theoretical framework only.

II THEORETICAL SECTION

1. Definitions of Basic Concepts

1.1 Definition of stress. The term stress appears, at first glance, to have a sufficiently specific meaning in everyday language; the idea of strain, pressure, compulsion, or emphasis; or a mechanical force causing deformation or change of volume (see e.g., the Scribner Bantam Dictionary by Williams, 1979). In contemporary stress research, however, this term is defined and used in at least three different, and equally well justified, ways. For example, Leventhal and Nerenz (1983; see also Lazarus, 1966) note that some authors use the term to refer to stimuli disrupting the normal activity of an organism (Appley & Trumbull, 1967; Holmes & Masuda, 1974); some others restrict the use to describe responses of the organism to particularly demanding events (Burchfield, 1979; Selye, 1973); and still others employ the term to cover the entire coping process with disruptive events (Lazarus, 1971; Mechanic, 1974).

As a visual aid, the $S \rightarrow O \rightarrow R$ paradigm (stimulus - organism - response model) may be of pedagogical value: The first two definitions choose either the S or R, respectively, in their conceptualization of stress, and the third definition involves the whole paradigm, including such aspects of the O as the coping resources or cognitive style of stress appraisal.

In the present study, the term is used to refer to events with a potential for disrupting the normal activity of human

beings. The choice is based on the clinical use of the term stress, e.g., as represented in the title of the well-known study, "The effect of stress on dreams" by Breger, Hunter, and Lane (1971): Stress is conceived as a stimulus resulting in a particular response such as changes in dream content. In many studies or reviews, the term stressor rather than stress carries the same denotation (e.g., Breznitz & Goldberger, 1982). In the present study, the term stressor is defined as referring to components of the total stress. For example, the stress disrupting the functioning of a person may consist of a cluster of aversive events: Each of them can be regarded as a particular stressor.

Within the framework of the present study, the definition of stress as a disruptive complex of stimuli has some important advantages over rival definitions. Above all, Selye's (1973) classical definition of stress as a "nonspecific response of the body to any demand made on it" (this definition is frequently followed in the introduction to psychology textbooks, e.g., Zimbardo, 1979) may be confusing when applied to research beyond the level of basic psychophysiological responses to stimuli. Selye (1956) assumed that all stressors, regardless of their particular type, lead to the same pattern of physiological (pituitary, adrenal, cortex, thymus, and visceral) responses. Psychological responses, however, vary from individual to individual: The concept "nonspecific response" does not

encompass this variability. For the purpose of the present study, Selye's definition might be too restrictive or unwieldy.

The disadvantage of defining stress as the coping process lies in the complexity of the process itself: The concept allows for a wide variety of dynamic models and encompasses a too wide spectrum of areas to be studied. Although in the long run this global approach might be most fruitful, it is not well suited in the present study because it transcends its underlying S - R paradigm. The present study benefits from a restriction to the S - R model by focusing on possible correlational relationships between reported events and reported sleep disorders.

Due to a lack of research in this area, it is a valuable first step to study the two variables (or two clusters of variables) in isolation. In the future, however, the emphasis is likely to shift to a more refined analysis of interactions of the S and R and intervening variables such as individual cognitive or coping style or environmental factors such as social support systems (see Dean & Lin, 1977).

The preceding review of conflicting definitions of stress may convey the impression of a substantial disharmony. The conceptual diversity, however, as pointed out by Breznitz and Goldberger (1982) has a positive aspect: The lack of consensus properly reflects the rapid expansion of stress research in many divergent directions and the expansion is likely to provide more valuable data for future theories than would a premature conceptual restriction.

Even though the present study is limited, on the theoretical level, to the S - R paradigm, it is obvious that various intervening variables are involved. The focus of the study is on reports of events rather than on the real underlying incidence of events. Subjective perceptions, selections, and evaluation of events are likely to largely modify the objective data. On the methodological level, the S is substituted by subjective reports of stressful events and R by similar estimates of incidence of sleep disorders. The study is fully based on subjective indicators. The estimates were retrospective: The participants were to report events which occurred in the last six months. It is reasonable to assume that both the S and R were modified by various subjective factors such as memory and/or defensiveness: factors which would be better represented by the S - O - R model. However, the investigation of similar factors would unduly enlarge the scope of this study.

1.2 Definitions in the area of sleep disorders. Clinically, a wide variety of sleep disorders is known: nightmares, insomnia, enuresis, sleep talking, somnambulism, and bruxism (Arkin, 1978; Association of Sleep Disorder Centers & Association for the Psychophysiological Study of Sleep, 1979; Broughton, 1968; Hartmann, 1984). The present study is limited only to nightmares and insomniac disorders. The main reason for this limitation is a too far reaching inadequacy of self-report estimates of the incidence of the other disorders: Many persons may be unaware of their bruxism, sleep talking, or somnabulic behaviour, or

could be defensive about possible incidents of enuresis. More objective measures are essential for meaningful research in this area.

1.2.1 Definition of nightmares. Objective definitions of nightmares have a firm basis in psychophysiological indicators provided by the equipment common in contemporary sleep laboratories, i.e., electroencephalographic (EEG), electro-oculographic, skin resistance, heart rate, and respiratory rate measures, etc. (Association of Sleep Disorder Centers & Association for the Psychophysiological Study of Sleep, 1979). The research in laboratory settings delineated two main types of nightmares (see e.g., Kahn, Fisher, & Edwards, 1978): (a) nightmares occurring within episodes of rapid eye movement (REM) sleep; and (b) night terrors, which occur in an arousal state (usually an arousal out of Stages 4 or 3 of sleep or more rarely out of Stage 2). The former are often referred to as REM nightmares or as anxiety dreams. They occur more frequently than night terrors and terminate on arousal. Night terrors are sometimes referred to as non-REM (NREM) nightmares. They occur out of physiologically quiescent NREM sleep as indicated by normal cardiorespiratory rate and absence of skin resistance changes prior to the attack. The person may scream, and passes into an aroused state as documented by alpha rhythm, motility, often somnambulism, accelerated heart rate, increased skin resistance, and increase in respiratory amplitude. The heart rate may actually triple: Similar arousal is not seen in REM nightmares.

When an REM nightmare is accompanied by an intense physiological arousal, the increase in symptoms (heart and respiration rates) is more gradual (Fisher, Kahn, Edwards, & Davis, 1973; Fisher, Kahn, Edwards, Davis, & Fine, 1974). Night terrors are more severe than REM nightmares but are less frequent (Fisher, Byrne, Edwards, & Kahn, 1970; Fisher et al., 1973).

Still another type of nightmare is the hypnagogic nightmare, i.e., anxious arousal out of Stage 1 during sleep onset or out of Stage 1 in later sleep (Fisher et al., 1973; Gastaut & Broughton, 1965). This type seems to be rather infrequent compared to REM nightmares and is more rarely described in clinical literature at present. Valuable rules for the distinction between the various types of nightmares were recently outlined by Hartmann (1984). The rules were derived from clinical experiences involving both sleep laboratory monitoring and in-depth individual interviews. Hartmann suggests that night terrors differ from REM nightmares in several respects:

1. REM nightmares tend to occur late during the night (4 - 7 a.m.) and usually from a long REM period (often 20 - 40 minutes after REM onset). In contrast, night terrors tend to occur earlier during sleep.

2. When asked whether or not their experience during the night terror episode could be described as a dream, the night terror sufferers found the question absurd--in their opinion, the episode was definitely not a dream. In contrast, REM nightmare sufferers typically described their nightmare experience as an unusually intense dream.

3. Group mean MMPI profiles of night terror sufferers might be more normal than those of REM nightmare sufferers. In clinical interviews, the former is likely to be more defensive and less open about personal problems than the latter.

Another clinically important type of nightmare is the post-traumatic nightmare. These are repetitive replays, with minor variations in content, of a traumatic event from the waking life, or they could be described as dream variations of the traumatic events. They were observed in large groups of persons or individuals temporarily exposed to situational stress such as accidents, war, or captivity. According to Hartmann (1984), posttraumatic nightmares are less frequent in the sleep laboratory than in home settings. This complicates their psychophysiological evaluation, unless home monitoring devices are used. Post-traumatic nightmares have been observed in some studies to arise mainly from REM sleep (Greenberg, Pearlman, & Gampel, 1972) and in others chiefly out of Stage 2 (Schlossberg & Benjamin, 1978). Sometimes nightmares with the same content features were reported from different stages of sleep (Hartmann, 1984; Lavie, 1982).

The majority of nightmares reported by the participants in the present study are likely to be REM nightmares both because (a) night terrors are more rare, and (b) night terror episodes are frequently followed by amnesia or no content recall. Kahn, Fisher, and Edwards (1978) found content recalled only from 58% of night terror arousals. Fisher et al. (1970) found Stage 4 night terrors only in 4% of 200 persons complaining of nightmares.

The above distinctions between different categories of nightmares were primarily based on objective criteria. In contrast, the present study is exclusively based on subjective indicators: The rationale of the procedure is explained in the introductory chapter. Subjective indicators, however, have an important place in nightmare research. It is almost exclusively the subjective experience of the dreamer, recounted on a post facto basis, which provides phenomenological material distinctive of this type of dreams. Although the nightmare dream varies in the prelude and scenery, its unique feature is anxiety. Therefore, in questionnaires drafted to collect data in the present study, nightmares were defined for the participants as "any frightening dream" (see the questionnaire in Appendix I).

1.2.2 Definitions of insomniac disorders. Objectively, insomnia could be defined by a reference to sleep parameters: longer sleep latencies and/or frequent intermittent awakenings with subsequent inability to fall asleep again. In this manner, Frankel, Coursey, Buchbinder, and Snyder (1976) were able to distinguish two subtypes: sleep onset insomnia and sleep maintenance insomnia. Research with objective criteria in this field has succeeded in dissipating some old misconceptions. Yet, again, subjective indicators are also important for the following reasons. Above all, a larger inter-individual variation in the subjective need for sleep (some persons sleep, by choice, only five hours or less a day--some others may spend more than 14 hours sleeping) renders it difficult to coin a specific objective

criterion for insomnia. An attempt to employ a statistical criterion of how many hours a day and/or how many intermittent awakenings constitute healthy sleep would be blind to individual needs.

The issue of individual variation is complex. Not all persons who have objectively abnormal sleep complain of sleep disturbance and not all those who complain have abnormal sleep (see a review in Beutler, Thornby, & Karacan, 1978). Especially serious theoretical considerations are based on investigations of sleep reduction effects in normal subjects. On the one hand, sleep reduction experiments on volunteers suggest that reductions of as much as two or more hours a night do not result in major behavioural consequences in the waking life (Friedmann, Globus, Huntley, Mullaney, Naitoh, & Johnson, 1977; Mullaney, Johnson, Naitoh, Friedmann, & Globus, 1977; Webb & Agnew, 1974). On the other hand, a person may complain about insomnia even though his or her sleep parameters do not deviate in the anticipated direction from measures on normal controls. Some persons, when awakened from NREM sleep, claimed they were not sleeping (Rechtschaffen & Monroe, 1969). However, their systemic activity during sleep was heightened and, it is possible that, subjectively, their sleep appeared too unrefreshing and similar to being awake. Thus, although sleep is present as shown by objective criteria, it may fail to bring its normal restorative effect.

Large discrepancies between objective and subjective criteria are not necessarily present in all persons complaining

of insomnia. A well-controlled study by Frankel et al. (1976) demonstrated differences in the expected direction between a matched sample of insomniac and normal controls. The differences were significant, in spite of some tendency of insomniacs to underestimate, and a tendency of normals to overestimate their sleep as measured by sleep onset latencies, total sleep time, and sleep efficiency (the latter is in the ratio of time spent asleep to total time sleeping and/or attempting to sleep). Thus, the subjective estimates were, in spite of their inaccuracy, meaningfully related to the objective measurements.

Carskadon, Dement, Mitler, Guilleminault, Zarcone, & Spiegel (1976) compared sleep laboratory data with subjective estimates of total sleep length in 122 drug-free persons complaining of insomnia. The subjective estimates were collected via sleep questionnaires administered in the morning (before access to clocks) after the all-night sleep recordings: 115 persons provided the estimates. Although there was a significant difference (t-test) between the average recorded sleep time (375.0 minutes) and the average estimated total sleep time (322.8 minutes), large individual variation in the accuracy of the estimate was present. In 21 persons, the estimates were within 15 minutes of the recorded total sleep time and 15 persons were actually found to underestimate their sleep time by more than 15 minutes.

Very important in this area is a recent investigation by Sewitch (1984). She suggests the perception of having slept is a complex cognitive interpretation made on the basis of a broad spectrum of inputs, both psychological and physiological, external and internal. Some aspects of the input may be contradictory and produce a feeling of uncertainty. According to Sewitch, sleep/awake perception involves selective filtering out of critical features which differentiate the two states rather than relate the two states together: These perceptual skills might improve with practice and reinforcement. The task is especially difficult for awakenings out of REM or Stage 2 sleep because the psychophysiological input might be especially confusing or contradictory.

Sewitch studied the ability to discriminate sleep and wakefulness in 11 normal volunteers (age 20 to 35) free of sleep/wake disorders. All were carefully screened for drug and alcohol ingestion, including marijuana. The first night in the laboratory was to allow the subjects to adjust to unfamiliar settings (an adaptation night): The subjects slept undisturbed, however, with their headphones in place. On subsequent experimental nights, the persons were awakened from REM and from Stage 2 sleep and asked to identify whether they were asleep or awake. They also were to rate the degree of certainty or confidence in that decision on a 3-point scale. They also were subjected to the same inquiry in periods of polygraphically identified wakefulness. Over one-half (55%) of awakenings from

Stage 2 sleep and over one-fourth (27%) of REM sleep awakenings were misclassified as periods of wakefulness. On the one hand, Sewitch's experiment indicates that subjective indicators may often be misleading even in normals, especially in some stages of the sleep cycle. On the other hand, the discrepancies between subjective perceptions (or evaluations) and somnographic data should not be interpreted to indicate that the former are useless. Subjective data might be expressive of factors such as individual differences in the need for sleep of specific length and quality. Moreover, it has also been suggested (Karacan, Williams, Littell, & Salis, 1972) that persons who complain of disturbed or insufficient sleep but produce normal somnographic recordings (as judged by contemporary criteria) might have as yet undisclosed waveform abnormalities. Obviously, objective criteria in their contemporary form are insufficient for the definition of insomnia: Further research simultaneously involving both objective and subjective criteria is needed to clarify their practical potential and relationships.

As discussed in the introductory chapter, the present study is based on subjective estimates. Subjectively, the complaints about sleep quality centre around the following issues: (a) sleep onset delays; (b) frequent awakenings with inability to induce sleep again; (c) lack of the restorative effect of sleep (sleep may be present but is unrefreshing); and (4) sleep disrupted by tension, restless motility, or sleep talking (i.e., not quiet sleep). Accordingly, it is possible

to assess insomniac complaints on the basis of the above four categories. The first two (sleep onset insomnia and complaints about frequent awakenings with difficulties falling asleep again) were demonstrated as relatively independent dimensions in a factor analytic study by Evans (1977). The latter two categories were included to assess complaints related to qualitative rather than quantitative aspects of sleep.

The four types of insomnia (subjectively perceived) symptoms or symptom clusters were defined in the following manner to the participants in the present study: (a) "difficulties falling asleep"; (b) "having woken up during sleep time...and had difficulties falling asleep again"; (c) "felt...that your sleep did not refresh you as it usually does"; and (d) "felt...that your sleep was not quiet, i.e., you were moving restlessly or feeling tense or speaking, etc., while asleep". Instructions added to the questionnaire items (see Appendix) specified that, for any of the four types, only disturbances not caused by extremes of climate, outside noise, thirst, etc., should be reported.

2. Review of Literature

In a simplified manner, waking life events could be seen as a cause, and sleep disorders as their effect. Obviously, the reality may be much more complex. Thus, for example, even if increased life stress were associated with an increase in pathological symptoms, the nature of symptoms may differ from person to person. The same aversive event, e.g., being in an

accident and narrowly escaping injury, could be associated with subsequent headaches in one person, insomnia in another person, and involuntary muscular spasms of extremities in still another person. Some persons may react to a prolonged stress by developing hypertension and cerebrovascular accidents (CVAs). Other persons under similar circumstances may develop gastric overacidity and ulcerations. According to Wolff (1950), people could be classified as "stomach reactors" or "pulse reactors", etc., depending on their most frequent physiological reactions to life stress. This context of psychosomatic theory reminds us that correlations of reports of sleep disorders to reported incidence of stressful life events may be low and nonsignificant. The effect of life stress may disperse across a wide spectrum of possible symptoms of pathology and, thus, its impact on only one of too many target symptoms, i.e., on sleep disorders, could be negligible. If reports of the incidence of stressful events and of sleep disorders are reasonably accurate, their analysis may reflect this lack of correlation.

There is still, however, considerable evidence that some impact may be detected, at least in some persons, in some situations and/or following certain types of life events. Experimental studies have shown that emotionally intensive pre-sleep experiences alter sleep parameters (Goodenough, Witkin, Koulack, & Cohen, 1975; Witkin, 1969) and/or dream content (Breger et al., 1971; De Koninck & Koulack, 1975). The study

by Goodenough et al., is especially impressive due to its complex design and wealth of accumulated data. The participants were 28 male night workers who were paid to sleep for five days in the sleep laboratory during the hours they usually slept at home. The first night was used to adjust the persons to laboratory environment and procedures. The four subsequent sessions (scheduled at least a week apart) were used to collect the data on the effects of presleep stress (viewing emotionally upsetting versus neutral films) on respiration rate, respiration rate irregularity, and mood. The latter variable was measured as amount of change in scores on a mood questionnaire before and after the films. The measure of respiratory irregularity was the root mean of the squared differences between successive breath times.

Sleep onset latencies were significantly longer after emotionally upsetting than after neutral films. No impact of the presleep film experience on total length of sleep, on the number of REM periods, and on the number of recalled dreams was observed. The stress films, however, increased dream anxiety and also reduced amount of social affection in dream content (as assessed by a measure developed by Gottschalk, Winget, & Gleser, 1969). The impact of upsetting films on irregularity of breathing was more clear-cut in some participants than in others. Taking into account this interindividual variance led to fruitful detailed analyses of the data: Persons who responded (while awake) with irregular breathing to stressful films showed

significantly more respiratory irregularity for REM periods after viewing the stressful than after the neutral films. No comparable trend was found in persons who did not respond with respiratory irregularity to the stressful films.

This study represents a research approach rather typical of contemporary laboratory research of the impact of stress on sleep parameters: Real life stress is often substituted by artificial stimuli such as emotionally upsetting scenes in motion pictures. Some evidence that stress might affect sleep parameters is also available from a study in which real life stressors were retrospectively assessed with a questionnaire measure of life stress. Healey, Kales, Monroe, Bixler, Chamberlin, and Soldatos (1981) used a list developed by Holmes and Rahe (1967) to assess the extent of stress to which participants in their study were exposed within a period of one year. The questionnaire developed by Holmes and Rahe lists 43 events which require adjustmental effort and, thus, were considered by the authors as stressful (e.g., a jail term). Using this measure of stress, Healey et al. demonstrated that the onset of insomnia in chronic insomniacs was preceded by a greater number of stressful events than the number experienced by good sleepers during a time interval of the same length. If life stress indeed results in an increased incidence of sleep disorders, the question why this does happen should be researched. The issue has not yet been sufficiently clarified.

Psychophysiological studies have been primarily aimed at describing the nature of sleep disorders rather than their possible external causes (see Fisher et al., 1973; Fisher et al., 1974; Frankel et al., 1976). Psychodynamic hypotheses are many, and most of them seem very difficult to test experimentally. Freud (1920), for example, hypothesized that posttraumatic nightmares are unsuccessful attempts of the ego to master a traumatic experience and should be treated as expressions of an underlying death instinct.

The idea that nightmare dreams are unsuccessful attempts to master an overwhelming event continues to be viewed as a useful working hypothesis (Greenberg et al., 1972; Greenberg, Pillard, & Pearlman, 1972). Horowitz and her colleagues suggest that repetitive reliving of traumatic experiences in different forms of mental activity such as fantasy or dreams may help the individual in adjusting to the traumata (Horowitz, 1969; Horowitz & Becker, 1971a, 1971b, 1971c).

The dream experience often seems only distantly related to or symbolic of a real life event rather than its direct rehearsal. A symbolic reliving, with certain variations, of upsetting events has been interpreted in Piagetian framework as a process of forming more adequate strategies to interpret reality and cope with stressful situations (Piaget, 1951a, 1951b; Piaget & Inhelder, 1969). Adler (1912), Bjerre (1936), Breger (1967), Maeder (1912), and Maeder (1913a, 1913b) also viewed

dreams as problem solving attempts, i.e., as an adaptive mechanism. Closely related views were presented by Dewan (1970), Greenberg, Pearlman, Fingar, Kantrowitz, and Kawliche (1970), and Jones (1970).

Experimental attempts to demonstrate impact of waking life experiences on sleep parameters and/or dream content (see Greenberg et al., 1972; Witkin & Lewis, 1967) were, as mentioned earlier, frequently based on investigations of effects of presleep viewing of presumably stressful or emotionally intensive films such as films depicting accidents, autopsy, childbirth, and circumcision rites. To the extent to which the presumably stressful movies were stressful to the viewer, sleep parameters were altered. For example, in the study by Goodenough et al. (1975), which was described earlier in this chapter, the data were analyzed separately for persons showing more clear-cut physiological responses to presleep films and for those with less marked responses. As mentioned earlier, measures of breathing irregularity were found to be an important indicator. Persons with a significant increase in respiratory irregularity in time periods in which stressful scenes appeared in presleep films were labelled as waking responders ($N = 16$) and compared to persons who did not show a similar increase ($N = 12$). Only the former showed significantly more respiratory irregularity in REM periods after viewing the stressful films than after neutral films. Similar effect was found when the participants were divided on the basis of the impact of the stressful films

on their mood. Persons who reacted with reports of anxiety to the stressful film (as indicated by scores on a mood checklist), i.e., the waking responders ($N = 19$), reported more anxiety laden dreams after the stressful film than after the neutral motion picture. Thus, the impact of the stressful movie on dream content was more pronounced in this subgroup than in other participants.

The study by Goodenough et al. is of special pedagogical value because the extensive analyses of the data clearly demonstrated the paramount methodological importance of both the choice of an adequate presleep stressor and of considerations of interindividual variability in the extent of impact of presumably stressful stimuli. Not all studies, however, were as well designed as the Goodenough study. A detailed review of studies in which the research design involving emotionally intensive or stressful films has been used shows a gradual refinement of methods and increase in the level of complexity of hypotheses and findings over the last two decades. This gradual development and struggle is comparable to research progress seen in other sciences, such as physics.

For example, an early study by Foulkes and Rechtschaffen (1964) compared the impact of presleep viewing of violent and nonviolent motion pictures on dreams. The participants were shown two films on two different nights: a film about attempts of a robber to free his brother from jail and a film comedy about matchmaking in Western settings. The former was described by the

authors as violent and the latter as nonviolent. Direct incorporations of unchanged film sequences were only rarely found in the dream reports. The REM dreams from the night following the violent film were longer, more imaginative, vivid, and emotional but neither more violent nor more unpleasant than those following the other film. No significant difference in effects of the two films was found with respect to sleep latency and to REM and NREM proportions of reports.

An inspection of the details of the design and outcomes of this study shows how it anticipated some of the contemporary concerns with the relationship of presleep stimulus material to personality of the subjects. The subjects were 13 male and 11 female paid volunteers. Those who had not previously served as sleep subjects (21 of the 24) were required to spend an initial adaptation night in the laboratory in order to avoid the first night effect (Rechtschaffen & Verdone, 1964). Then two experimental nights were scheduled (never on successive nights; usually spaced one night apart). One of the two films was seen on each experimental night, prior to sleep. One half of the persons saw the violent film on the first and the matchmaking comedy on the second experimental night. For the other half, the sequence of the films was reversed. After seeing the film, they completed a short questionnaire on their reactions to the characters and plot of the film and also on their mood after seeing the film. Then they slept in the laboratory; continuous EEG and ECG recordings were taken until the time the person had indicated he or she wished to arise in the morning.

On film nights, the persons were awakened according to the following schedule in order to gather dream reports:

1. NREM 10 minutes after the initial onset of 12- to 14-cps sleep spindles.
2. REM First REM period, 5 minutes after first REM.
3. REM Second REM period, 10 minutes after first REM.
4. REM Third REM period, 20 minutes after first REM.
5. NREM 25 minutes after final REM of fourth REM period.

Although the last two awakenings took place in the majority of cases, some persons never reached the last scheduled stages in the sleep cycle and the awakening had to be omitted.

The volunteers were awakened by their names being called (all communications were via intercom system--the person remained in the darkened laboratory bedroom), and were asked if anything was going "through their mind" just prior to the awakening stimulus. In order to avoid influencing the subjects, the question did not suggest whether or not the mental experience was of a dream-like quality. If the person stated nothing had been going through his or her mind or if he or she indicated he or she was uncertain about the nature of the just elapsed mental experience, the person was encouraged to "think on it" for a minute or so. All reports were tape recorded and, later on, transcribed.

Upon arising in the morning, the person was asked to recall the reports made upon the various awakenings at night and to

rate each of the mental experiences during sleep with respect to vividness, distortion, violence-hostility, emotionality, pleasantness, dramatic quality, his or her own degree of activity as the dream character, and degree of control exercised over events in the dream.

The authors sympathetically commented on the subjective inconvenience to which the volunteers were exposed by being awakened several times from sleep and asked to verbalize complex inner experiences and also on the discrepancy between the intellectual level of the volunteer subjects (most were either students or employees of the University of Chicago) and the rather primitive plot and poor aesthetic quality of the two presleep films. This was probably the greatest drawback of the experiment. The major goal of this experiment was to evaluate the impact of violence in mass media on viewers. However, the design failed to replicate or represent the everyday North American reality in which people have a free choice of viewing or not viewing a specific television program. Although the two films were fairly representative of films shown on some channels of commercial television, persons who habitually view such programs probably differ, in terms of aesthetic and cultural preferences and of socioeducational background, from the volunteers in this sleep laboratory experiment. On the basis of similar considerations, Foulkes and Rechtschaffen concluded that the level of viewer's involvement in the two films was probably minimal. Accordingly, the incidence of

direct incorporation of the content of the two films in dreams was "very low". Quite damaging to the design of this study was also a subtle difference between the violent and the matchmaking film. The former was, according to the authors, poorer than the latter in terms of aesthetic or critical standards; this was also indicated by the responses of the majority of the volunteers to a post-film questionnaire. Viewer involvement, i.e., the degree of identification with the dream characters, is likely to be proportionate to the degree of film incorporation in subsequent dreams. If the matchmaking film was judged by the subjects as superior to the violent film, then this could unduly counteract the otherwise greater impact of the violent film on dreams and sleep.

In their excellent discussion of the experiment, Foules and Rechtschaffen clearly showed the need for better matching of the film content with the personality of the volunteer subjects. It is possible, however, that at least with respect to some somnographic data, the compatibility of the intellectual level of the viewer and the nature of the film is unimportant: The violent or sexual content might affect the viewers on some level, regardless of their conscious rejection of the film for other reasons. Further research in this area with multilevel physiological recordings could provide valuable tests for some traditional hypotheses about the impact of waking experiences on dreams, especially for those based on Freudian theories.

Subsequent study by Foulkes' team (Foulkes et al., 1967) was based on a more adequate match between viewer's personality and the nature of presleep films. The participants were 32 boys between 6 and 12 years old, mostly sons of university students or employees. All were of broadly middle class socioeconomic background. They slept for two nights in the laboratory. One night at home under normal conditions was interposed between the two experimental nights. Prior to sleep in the laboratory bedroom, the boys were shown two 10-minute films--one on each night. One of the two was a Western ("The Indian Raiders") with an openly aggressive content: a band of Indians savagely attacking white settlers. The other film ("This is Baseball") was a baseball documentary free of manifest violence but of sufficient interest for children in the given age group. Following each film, the projectionist rated, on the basis of the boys' behaviour, the manifest interest in the film on a scale ranging from 1 (quite inattentive) to 5 (rapt attention). Both films aroused considerable interest of the boys, with the Western obtaining somewhat higher rankings (4.47) than the baseball documentary (4.06).

The boys were awakened 10 minutes after the onset of the first four REM periods (only REM periods of at least 10 minutes duration were considered). Only 249 of the scheduled awakenings were obtained because some of the boys (5 of the 32) did not experience the planned number of sleep cycles. The percentage of dream recall was only slightly lower than that observed in

adults. Only few direct incorporations of the film content were found. Paradoxically, presleep viewing of the baseball documentary was followed by more lively, hostile, and frightening dreams than the viewing of the Western. Foulkes and his co-workers concluded that presleep viewing of the aggressive film appeared to reduce dream intensity in general and hostile-unpleasant content in particular.

Sleep latency and time to initial REM period were not systematically affected by viewing of the two films.

At least two considerations obstruct interpretation of the findings. First, although the children's behaviour might have indicated more viewer involvement for the Western, it is possible that, on some physiological or psychological level, the baseball documentary had more impact. The documentary was closer to real life competitive experiences (and frustrated aspirations) of the boys and could activate unmastered inner conflicts. In contrast, the Western is usually identified by the viewers as a fantasy only distantly related to contemporary life.

Second, another consideration places this study in the context of research on compensatory phenomena. Most studies of incorporation of presleep experiences in dreams might be complicated by compensatory tendencies: Dream content often seems to compensate for the failure of the presleep experiences to provide certain types of stimulation. This was shown in several studies. For example, Hauri (1967) asked the subjects to engage in six hours of physical exercise, and found a decrease in dream content involving physical

activity. Wood (1962) placed his subjects in social isolation prior to sleep, and found an increase in social themes in the dream content. Similar effects could be involved in the early studies by Foulkes and his colleagues: Presleep viewing of an aggressive film reduced the incidence of hostile-unpleasant content in dreams.

The early studies show that the relationship of specific everyday presleep stimulation to dream content is difficult to demonstrate in sleep laboratory settings. The clinical lore associated with clinical observations of posttraumatic nightmares has, however, been suggestive of the possibility of achieving greater effects on dreams with more extreme presleep stimulation.

Thus, there was a need for a more obviously stressful motion picture in order to provide a more adequate substitute for the real life stress. For several reasons, one of the most frequently used stressful films is the film "subincision". The film shows circumcision rites of Australian bushmen. During the rituals, older males perform the operation with crude instruments, and thus inflict pain on adolescent boys. This film has been demonstrated to induce stress as measured by different physiological indices (Lazarus and Opton, 1966). The motion picture has also been found to induce high levels of intrusive thinking and intrusive references as compared to more neutral stimuli (Horowitz & Becker, 1971a, 1971b, 1971c; Horowitz, Becker, & Moskowitz, 1971). In their studies, Horowitz and Becker defined intrusive thoughts as implying a nonvolitional entry into awareness, being difficult to dispel, being experienced as something to be

avoided, and recurring in an identical fashion. Thus, their characteristics are similar to some features of nightmare dreams. Therefore, the film Subincision theoretically appears to have a substantial potential for influencing dream content in an aversive manner.

However, elements of the stressful motion picture can often be incorporated in an indirect manner too, e.g., via symbols. To trace the symbolic incorporation of the presleep movie experiences, Witkin and Lewis (1967) used traditional clinical methods of dream interpretation. They were able to identify elements from two presleep films (the "Subincision" film and a child delivery film) in dream reports collected in sleep laboratory settings. The elements were indeed frequently substituted by various symbols. For example, one participant dreamt, after being shown the birth film, about an airplane with its door opening and parachutists jumping out: This dream scene was interpreted as symbolic of child delivery.

In their study described earlier, Goodenough et al. (1975) compared effects of the circumcision film and of the child birth film with effects of neutral travelogue films: The former two induced significantly more anxiety as shown by changes in questionnaire scores assessing the mood before and after viewing the films. As reported earlier, the two stressful films also increased dream anxiety as measured by Gottschalk-Winget-Gleser (1969) scales. Thus, it seems that the circumcision movie was an adequate stressor. The childbirth

documentary was also efficient in this respect: It is a medical teaching film showing delivery of a baby with the use of a vacuum extractor.

De Koninck and Koulack (1973, 1975) used a movie entitled "It didn't have to happen". The movie depicts three industrial accidents: In the first, the tip of a worker's finger is cut off; in the second, half of a worker's finger is cut off; and in the third, a worker is killed by a board shot from a circular saw. The film induced changes in the mood of the participants as shown by significant shifts on scales of a mood measure: There was a significant increase in anxiety and depression and a decrease in surgency and social affection. The exposure to the film led to a significant increase in sleep latency.

Thus, both in the study by De Koninck and Koulack and in the study by Goodenough et al., a significant increase in time needed to fall asleep was observed. This provides an interesting parallel to clinical observations of insomnia following stressful events such as battle experiences (see Grinker & Spiegel, 1945; Hastings, Wright, & Glueck, 1944). The experimentally induced delayed sleep onset parallels sleep onset insomnia. A similar experimental parallel to sleep maintenance insomnia can be found in observations of a significant increase in the number of spontaneous awakenings from REM periods (see Witkin, 1969).

The impact of similar motion picture scenes does, however, not match the impact of intensive real life stressors such as death of a family member or of a close friend, or the experience

of a life threatening illness. It is likely that the latter stressors have more powerful impact on sleep parameters and the dream content. Therefore, some researchers attempted to evaluate the relationship of stress to sleep and dream variables by studying persons undergoing a major real life stress. For example, Wadeson (1966) collected morning dream reports from an epileptic hospitalized patient who anticipated repeated surgery to be performed on him. There was a significant increase in dream anxiety on days prior to surgical operations.

However, this could also be explained by pointing out the impact of changes in the levels of waking anxiety on the process of verbalizing dreams when preparing the dream reports or as a selective recall of more anxious dream scenes on days dominated by high waking anxiety. Similar crude distortions of valuable data are less likely to occur when sleep laboratory techniques of awakenings from REM sleep are used to study the dream content. The techniques were used in a study of real life stress by Breger et al. (1971). The study dealt with two types of stress: an anticipated surgical intervention (e.g., removal of a tumor in the colon), and intensive group therapy sessions. The anticipated threatening event distinctly influenced the dream content: both direct and symbolic incorporations of the threatening elements from the waking life were observed. Psychodynamic framework was used to interpret the findings. On the basis of extensive personality testing, the authors concluded that the impact of waking life

stress took different forms depending on the person's characteristic manner of coping with stress and on the individual meaning of the stressful event to the person. The dreams were interpreted as attempts to find solutions to the distressing or threatening situation: "The fears and conflicts symbolized in the dreams rarely appeared without an attempt to resolve or to cope with them in some way. Each S's attempts at defense in his dreams were consistent with his waking style. Attempts at solution were represented most clearly in the S's interactions and roles as a dream character." (Breger et al., 1971, p. 178). The value of the study by Breger et al. undoubtedly lies in examining the effect on sleep of powerful real life stressors such as anticipation of surgery for tumor removal. However, the number of subjects was very small: four in the group therapy study and five in the surgery study. Only two control subjects participated. This considerably limits the statistical inferences.

A very important study of impact of psychological stress on sleep parameters was carried out by Beaumaster (Beaumaster, 1975; Beaumaster, Knowles, & MacLean, 1978). Using the usual sleep laboratory techniques, Beaumaster evaluated the impact of an anticipated parachute jump on sleep parameters in a group of nine novice sport parachutists (persons with one previous jump) and in a group of nine experienced sport parachutists (at least 41 jump experiences before Beaumaster's experiment). Their anxiety level was assessed throughout the

study by self-report questionnaire measures. The questionnaire data suggested that "the execution, and to lesser extent the anticipation, of the jump was stressful, especially for the novice group" (Beaumaster et al., 1978). The novice parachutists experienced greater anxiety than their experienced counterparts while boarding the plane, during the take off, while stepping outside to jump, and during the freefall. The anxiety level in both groups was compared to anxiety in a control group of experienced sport parachutists ($N = 9$) who agreed not to jump during the course of their participation in the study. During the evening and morning prior to the anticipated jump, the novices reported significantly more anxiety than the controls.

The persons scheduled to jump were monitored in the sleep laboratory for four nights preceding the scheduled jump and one night after that event. Similarly, the control subjects were monitored during five nights. The three groups did not significantly differ in their sleep time and, therefore, the time spent in each stage of sleep was expressed as a proportion of the total sleep time and analyzed accordingly. Analysis of variance revealed no significant group versus night interactions. The exception was sleep latency: The group of experienced parachutists who were scheduled to jump took longer to fall asleep on the fourth night (the night before the scheduled jump) than did the experienced controls. No similar significant effect was, however, found for the novices.

The major finding of this study lies in the overall pattern in sleep measures over the five nights. Most changes were confined to the first three nights as documented by a gradual decrease, over the three nights, in the number of awakenings after Stage 1 sleep onset, decrease in time spent awake after Stage 1 sleep onset, and decrease in REM sleep latencies. The data strongly suggest that laboratory adaptation was the major influence on sleep. Similar effects of first exposure to sleep laboratory were often noticed also by other investigators (Agnew, Webb, & Williams, 1966; Rechtschaffen & Verdone, 1964). It is a paradoxical but important finding that adaptation to unknown but benign laboratory setting led to more salient disruptions of sleep than the anticipation and execution of a sport parachute jump. Maybe the failure of the anticipated jump in the group of novices to more strongly modify sleep parameters could be explained by the very nature of this event: The jump was desired and planned by the novices, could be seen as voluntarily self-induced, and was avoidable at any point in time prior to the jump without thwarting the progress of the person towards most of his or her other important life goals. And, above all, none of the persons was jumping for the first time.

The situation was different in a study by Lester, Burch, and Dosset (1967). Several types of stress were considered:

1. Comprehensive final medical school examinations: three Ss, who were medical students, were studied on different nights before, during, and after a week of the examinations.

2. One-day medical school exam: Five Ss were studied on three nights clustered around the examination and on at least two nights after the end of the semester.

3. The time interval anticipation task (TIAT) used on the same five Ss (as in the study on the effects of a one-day exam): In this task, the Ss had to anticipate and prevent the occurrence of repetitive tones. The tones were successfully avoided only when the S reacted by pressing a special switch every 10 seconds with less than 10% errors. As a presleep stress, the Ss had to engage in this activity continuously for 2 - 2½ hours before sleep. They were rewarded by being paid for good performance; thus, some motivation was induced.

4. Various unplanned stressful events as they happened accidentally to different volunteers (a total of 53 Ss participated in the study). Every evening, upon arrival, each S was interviewed for significant events during his or her waking day. For example, a medical student reported his first experience on a closed ward for psychotic patients: This event was classified as stressful.

As a general rule, a reduction in EEG Stages 3 and 4 was observed in association with waking life stress, such as examinations or accidental unplanned events; the TIAT had lesser impact on the delta sleep. On seven occasions, several Ss experienced considerable psychological stress due to personal problems. Their EEG profiles were then greatly disturbed with "no identifiable Stage 3 or Stage 4 sleep".

One S, despite the fact that he was deprived of sleep, showed no delta sleep for three consecutive nights. An interview revealed that his first homosexual experience had occurred prior to the three nights.

The examinations appear to be an important real life stressful event in the life of students. In the study by Lester et al. (1967), however, the experimenters had little control over the nature and outcome of the exam. Obviously, failing the exam would be more stressful, for the majority of participants, than passing it with excellence. This factor was well controlled in a more recent study by Cohen (Cohen, 1975, 1979; Cohen & Cox, 1975) and in a recent investigation by Koulack, Prevost, and De Koninck (1985).

In Cohen's study, 45 male undergraduate students spent one night in the sleep laboratory. Prior to sleep, 22 were exposed to a positive and 23 to a negative presleep stimulation. In the negative condition, the experimenter put off all questions by the volunteer subjects, maintained little eye contact, and went about his duties in a perfunctory manner. The subject was administered a short IQ test consisting of difficult items from the Wechsler Adult Intelligence Scale (1955). The test was introduced as a task which college students were supposed to finish with relative ease. Without knowledge of the volunteer, the timing was manipulated to unduly increase the task difficulty. In the positive presleep condition, the experimenter's attitudes were friendly and

congenial. A set of easy tasks from the Wechsler Adult Intelligence Scale (WAIS) was administered and the volunteer was complimented on his performance. Discussions about sleep research, recording procedures, and the laboratory equipment were encouraged (see Cohen & Cox, 1975).

The complexity of the design of Cohen's study goes beyond the framework of this report, mainly because of Cohen's emphasis on investigating differences between low neuroticism and high neuroticism subgroups (23 of his preselected volunteers were persons with scores in the top quartile and 22 in the bottom quartile of the Neuroticism Scale of the Maudsley Personality Inventory). However, more directly relevant to the present study are several of his findings. The negative presleep treatment of the volunteers was associated with a higher percentage of dream recall at the end of the night, especially in persons who were otherwise described as infrequent recallers. In the negative condition, overt or symbolic incorporations of the presleep laboratory situation were associated with a significant change between the presleep and postsleep mood: The latter was more positive.

The study suggests that negative presleep experiences might enhance subsequent dream recall and that dreaming or sleep is an adaptive process. More detailed interpretations of Cohen's study are, at least in some areas, obstructed by possible first night effects. There was no adaptation night to allow the subjects to adjust to sleep laboratory settings. The effect

could be more clear-cut in some individuals and the individual differences could override the differences in psychophysiological sleep recordings among the subgroups of participants. In contrast, the design of a recent study by Koulack et al. (1985) included an adaptation night, a baseline night, a third night for evaluating sleep parameters in an uninterrupted sleep condition, and an additional night for collecting dream reports via REM awakenings. Sixteen university students registered in an introductory psychology course participated. On the evening prior to the third and also prior to the fourth night in the sleep laboratory, the students were administered "intelligence test" tasks. The items were selected from several aptitude and intelligence tests. They were instructed that the research was designed to study the relationship between sleep, dreams, and intellectual functioning and that it was essential that they do their best on the test because it was assumed that the test results reflected as precisely as possible their intellectual potential. The instructions specified that "an average university student should complete most of the items before the expiration of the allotted time". The students were divided into two groups. The members of the first were administered difficult test tasks which could not be solved within the time limit. The second group was administered easy items. On the third night, both groups showed a significant increase in sleep latency and a decrease in REM density. Dreams of the persons in the stressful presleep condition (complex test items to be solved

in an insufficient time span) were more frightening and included more incorporations of the presleep laboratory experience. Presleep mood anxiety was at its highest in the group exposed for the first time to the stressful test situation, i.e., on the third night in the laboratory (the night of an uninterrupted but polygraphically recorded sleep). Even though the subjects were exposed to a similarly stressful treatment also on the fourth night in the laboratory (the "intelligence" assessment was continued), presleep anxiety levels were low. However, postsleep anxiety significantly increased after sleep that was interrupted for REM dream collection. The worsening of mood as shown by the difference between presleep and postsleep scores on the night of the REM sleep awakenings was more marked in persons with more incorporations of the stressful "intelligence" testing and in those who reported higher anxiety level in their dreams.

Awakening the person from REM periods about 8 to 10 minutes after their onset and questioning the person about the dream content is likely to enhance the recall of dream mentation on the following day during wakefulness. It is possible that similar procedures would be of great long-term value in psychological coping with stressful events because the person would be more consciously in touch with, and could benefit from, the adaptive process which may be inherent to REM dreaming. However, on a short-term basis, the uninterrupted night sleep

might be more beneficial, as suggested in the improvement of the presleep mood scores on the morning retest.

It would also be of some interest to replicate this study with the same design but with three groups of person: the members of the first to be awakened from REM sleep on the third night to gather dream reports and to have an uninterrupted (but polygraphically recorded) sleep on the fourth night; the members of the second to have the uninterrupted but somnographically recorded sleep on the third and the REM awakenings to gather dream reports on the fourth night; and the last group to have both the third and the fourth night uninterrupted (but somnographically recorded). This procedure could provide more detailed answers with respect to the immediate role of dreams in response to a very recent new type of stress, to the role of enhancing dream recall via REM awakenings, and to the merits of an uninterrupted sleep.

The preceding review of studies of impact of specific presleep experiences on sleep parameters and/or dream content strongly suggests that the nature of the presleep event is an important independent variable: Low psychological stress such as TIAT work or viewing Western movies are likely to have lesser impact than more psychologically stressful presleep experiences involved in medical school exams or in viewing documentaries on circumcision or childbirth or accident scenes. The level of disruptions of sleep and aversiveness in dream content increased with an increase in aversiveness of the

presleep experience. It is likely that an increase in stressfulness of presleep experience beyond the levels ethically acceptable in similar laboratory experiments would produce more clear-cut sleep and/or dream content disruptions to the degree seen in sleep disorders such as sleep maintenance insomnia or nightmares.

In summary, the studies on effects of presleep experiences on sleep and dreams suggest that reports of stressful events (if sufficiently accurate) may be significantly associated with the incidence of sleep disorders--in spite of the fact that the impact of stressful events could find its expression in a variety of psychopathological symptoms other than sleep disorders.

The reviewed studies also lead to the conclusion that the content of emotionally intensive presleep experiences could be, at least for some specific events, significantly related to reported content of subsequent dreams. However, a high correlation of the two variables is unlikely to be found because the waking life events may be, as observed by Breger et al. (1971) or Witkin and Lewis (1967), incorporated in dreams in a symbolic rather than a direct manner.

Before proceeding to a formulation of the hypotheses of the present study, it is of advantage to review studies of personality correlates of sleep disorders. If the studies in this area were suggestive of a rival etiological interpretation of sleep disorders, our hypotheses would need to be revised.

At first, the studies of personality correlates of nightmare frequency are reviewed. The few available studies often dealt with personality traits or behavioural variables of less central importance for traditional personality theories except perhaps for those closely linked to clinical practice. For example, a conscious concern about death was one of the variables. Obviously, this variable is closely related to the Freudian theory of death instinct and to his theory of posttraumatic nightmares (Freud, 1920). It may be noted that similar inner conflicts or a manifest ambivalence about death are often observed in nightmare sufferers: The conflicts may be observed across a variety of clinical material such as daydreams (Horowitz, 1969; Lidz, 1946). Lidz found suicidal ideas or concerns in 19 of 25 nightmare sufferers (i.e., in 76%).

Feldman and Hersen (1967) found a significant positive relationship between nightmare recall frequency (NRF) and conscious concerns about death (such as frequent thoughts of one's own death or of being killed in an accident, vivid images of one's own death, etc.). The Ss in their study were 168 psychology students. The finding was replicated by Hersen (1971) in a study on psychiatric inpatients ($N = 352$).

Lester (1968), using only female Ss and using another scale to assess concerns about death than did Feldman and Hersen, was unable to replicate their findings. In another study on female undergraduate Ss, in which again a different

scale was used than that used by Feldman and Hersen, Lester again found no significant relationship between nightmare frequency and the fear of death (Lester, 1969).

In a study on psychiatric inpatients, Hersen (1971) found that nightmare frequency was positively related to scores on Taylor's (1953) Manifest Anxiety Scale (MAS), negatively to scores on Barron's (1953) Ego Strength Scale, and positively to the incidence of sleep disturbances (taking a long time to fall asleep, talking or crying out in the sleep, grinding the teeth in the sleep, sleep walking, enuresis, awakening exhausted as if not having slept at all, awakenings for no apparent reason, awakening feeling frightened for no apparent reason, being afraid to go to sleep because of possible bad dreams, awakening with a headache, awakening during the night having to go to the toilet, tossing or turning around while asleep, waking up too early, awakening during the night feeling someone else is in the room, awakening with pounding heart or in a cold sweat). No significant relationship was obtained between the NRF and the scores on the Geer Fear Scale (Geer, 1965) or the scores on the Wolpe and Lang Fear Survey Schedule (Wolpe & Lang, 1964). Only when the difference in the two sets of fear scale scores was tested between the group of Ss who suffered from nightmares once monthly or more often and the group of those who suffered from no or less frequent nightmares, was a significant difference found in a t-test: The first group of Ss was found to be somewhat more phobic than the latter.

Haynes and Mooney (1975) found a significant positive correlation between MAS scores and nightmare frequency ($r = .17$). Similarly, nightmare frequency was found to be positively related to reports of insomnia $r = .23$, difficulty falling asleep ($r = .21$), time required to fall asleep again when awakened ($r = .43$), feelings of fatigue upon awakening ($r = .21$), etc. No significant correlation was found between nightmare frequency and age, sex, marital status, and frequency of awakenings at night. The Ss in this study were 284 undergraduate psychology students.

In another study, reported in the same article (pp. 229 - 231), Haynes and Mooney investigated the relationship between resting frontalis electromyogram measures and nightmare frequency. Resting muscle tension levels are directly related to other physiological indices of arousal such as heart rate and skin conductance, and may be used as a measure of general physiological arousal. No significant correlation between the frontal EMG measures and nightmare frequency was found ($r = .05$). Again, a significant positive correlation between the NRF and Taylor's MAS was found ($r = .23$). In regard to recurrent nightmares and some other measures, following correlations were reported: Individuals with recurrent nightmares took longer to go to sleep ($r = .22$, $p < .05$), demonstrated higher MAS scores ($r = .24$, $p < .05$), and awoke more frequently ($r = .30$, $p < .05$) than individuals with nonrecurrent nightmares. The Ss with recurrent nightmares were also found to report higher

nightmare frequency than Ss with nonrecurrent nightmares. In this second study, the Ss were 101 psychology students.

Starker and Hasenfeld (1976) investigated the relationship between the incidence of nightmares and daydreaming styles. Three types of daydreaming, as described in details by Singer (1975), were considered:

1. The guilty dysphoric style which involves a waking fantasy life characterized by guilt, fear, hostility, and ambition.
2. The positive vivid style involving a tendency to enjoy vivid pleasurable imaginal experiences.
3. The anxious distractible style dominated by absorption in frightening or bizarre fantasy and accompanied by poor attentional control.

The existence of the styles was demonstrated in factor analytic studies. Starker and Hasenfeld found that nightmare recall was positively related to guilty dysphoric ($r = .32$) and to anxious distractible style ($r = .25$) on a significant level. No significant correlation was found between the positive vivid style and nightmares ($r = .09$). The Ss in this study were 99 undergraduate college students.

No significant differences in age or gender in respect to nightmare reports were reported in the different studies.

An exception to this trend is the finding by Belicky and Belicky (1982) on a sample of 443 university students. In their sample, self-reported nightmare frequency was unrelated to gender, hypnotic ability, and major area of academic study. However, significant differences based on gender were found when the relationships were evaluated on extreme groups (comparing students with at least one nightmare a month with those who reported no nightmare in the past year). Women and more hypnotizable persons were more likely to be in the nightmare group. The area of study was also an important variable: Arts majors were more likely to report nightmares than Science majors. The latter were more frequently in the nightmare sufferer group than Mathematics and Engineering students.

One of the studies was carried out on Swiss adults in Berne (Cernovsky, 1983). The goal was to evaluate subjective estimates of nightmare frequency and to investigate nightmare content. The participants were students of the University of Berne. It was expected that nightmares in this population would frequently deal, directly or by symbolic means, with the stress of examinations. The sample consisted of 51 men (mean age 25.8 years, SD = 3.0) and 9 women (mean age 25.8 years, SD = 2.9). They were interviewed about the frequency and content of their nightmares during the last two years. Fifty percent reported having had at least one nightmare in the last two years, 36.7% no nightmare during this time span, and 13.3% reported not being able to remember whether or not they dreamt

a nightmare during the last two years. Comparisons of men and women with respect to relative proportions of those who reported having had no nightmares and those who reported having had at least one within the time span showed no significant gender-linked difference ($\chi^2 = .02$, $p > .05$, two-tailed). The dichotomous variable (reporting at least one nightmare versus reporting no nightmare) was unrelated to age ($r = -.21$, $p > .05$, two-tailed). Although the majority (73.3%) of those who reported at least one nightmare were able to remember the nightmare content, only five students (16.7%) reported the content in more than 10 words. The others only attached a general label to the nightmare such as "it was about my military service". When prompted to provide more detail they usually only reworded the same information. The content of nightmares was summarized along the following categories: being chased or persecuted (22.7%); war situations such as being bombed or having to escape (18.2%); examinations (18.2%); military service (18.2%); falling down (9.1%); blundering in front of an authority figure, such as the student's ex-teacher (9.1%); and various other themes such as father's death, animals, problems with a girlfriend, etc. (22.7%). The sum of percents is higher than 100 because some students reported more than one theme. In respect to the content, examination nightmares were not the most frequent type. As long as the manifest content was seen as the only criterion, the hypothesis underlying this study was not supported. It is possible, however,

that other nightmare themes, especially those of being persecuted, chased, or of war situations or military service could be expressive of the academic stress (being negatively evaluated in competitive situations, having to defend one's own position) or of its interpsychic component (self-imposed goals competing with less mature motives); themes of falling down might express an underlying fear of sudden failure.

Although the nightmare recall data are based on a time span of two years, the frequency of recall was lower than the frequency reported by Feldman and Hersen (1967) for North American students over a one year interval. It is not clear whether or not this cross-cultural difference was based on an underlying difference in the incidence of nightmares or only in reporting nightmare experiences. Cross-cultural explorations in this area might not only clarify whether or not differences in reporting or incidence are present but also whether they are meaningfully related to specific differences in personality, attitudes, beliefs, and lifestyles or in exposure to particular life stress situations.

Kales, Soldatos, Caldwell, Charney, Kales, Markel, and Cadieux (1980) studied 30 adult nightmare sufferers at the Sleep Research and Treatment Center of the Pennsylvania State University. All subjects were persons who responded to an advertisement for individuals with "a current or past problem of nightmares". Their scores on the Minnesota Multiphasic Personality Inventory (MMPI) were compared to scores of matched

controls. . The scores of the former were significantly higher on all clinical scales except the Masculinity-Femininity (Mf), Social Introversion (Si), and Hypomania (Ma) scales. The MMPI profile based on group means of the nightmare sufferers can be described by listing the first three profile peaks in order of their decreasing T-score values: Psychopathic deviate (Pd = 69.1, Schizophrenia (Sc) = 68.8, and Hysteria (Hy) = 66.2. The Pd and Sc peaks combined to a 4-8 code were very frequent among the individual profiles. This code was interpreted as descriptive of distrustful, alienated, and estranged individuals who use the strategy of emotional withdrawal, who overreact to mistreatment, who have difficulties in making the sacrifices necessary to maintain meaningful interpersonal relationships, and who often seek clinical help at times of situational stress.

A very important study was carried out by Hartmann, Russ, Van Der Kolk, Falke, and Oldfield (1981). The authors advertised in Boston newspapers asking for persons over 18 years old who "had frequent nightmares". In subsequent interviews, special attention was paid to excluding persons suffering from night terrors rather than REM stage nightmares. Thirty-eight persons who reported experiencing nightmares at least once weekly were selected for the study. Unfortunately, no group of matched normal or other matched controls was used. The subjects were evaluated by means of the third Diagnostic and Statistical Manual (DSM-III) of the American Psychiatric Association. Four persons were classified as schizophrenics, 9 as borderline, and

6 as schizo-typal. The remaining persons had no specific diagnosis. Most subjects had artistic talents or interests. The subjects were administered an extensive battery of psychological tests. The group means on the Minnesota Multiphasic Personality Inventory were elevated on Schizophrenia (Sc) and Psychopathic Deviate (Pd) scales for both sexes, on Depression (D) and Conversion Hysteria (Hy) scales for men, and on Hypomania (Ma) scale for women: The elevations were at, or close to, the distance of two standard deviation units from the original test norms.

In line with DMS-III trends towards schizophrenia and schizotypy and with MMPI elevation on the Sc scale, Rorschach responses were very frequently bizarre or unusual and showed problems in the areas of boundaries and penetrations. Mean score on Rotter Internal/External Locus of Control Scale was also elevated and indicative of a belief in external control. Thus, the subjects tended to perceive their life as controlled by external forces such as fate, chance, or powerful others.

The main finding of Hartmann's et al. study seems to be a potential relationship of nightmare incidence to symptoms of schizotypy or schizophrenia and to the presence of artistic creativity or interests. A common denominator of schizophrenia and creativity may be a production of unusual responses along the lines of divergent thinking. A major difference between the two lies in a lesser ability of schizophrenics to use their productiveness in a socially constructive manner, i.e., as a

contribution to others. The production of unusual responses is inherent to dream life in general. Maybe the persons in the sample studied by Hartmann and his colleagues consisted primarily of persons who were in closer touch with their potentially creative resources of spontaneous divergent thinking but simultaneously felt exposed, both in their waking and dreaming life, to overwhelming situations viewed as outside of their own control (as suggested by elevated scores on Rotter's scale). This stands in line with the finding by Hersen (1971) of low ego strength (Es) scores in persons with higher nightmare frequency: Low Es scores may be interpreted as indicative of a low ability to recover from environmental pressures and to constructively deal with stressful life situations (see Duckworth & Anderson, 1979).

The main problem in generalizing the results of the study by Hartmann and his co-workers lies in the lack of a control group. Fortunately, the study was replicated (see Hartmann, 1984; Hartmann, Falke, Russ, Oldfield, Sivan, & Van Der Kolk, 1981) with two control groups. Twelve lifelong nightmare sufferers (persons who reported having at least one nightmare a week and suffering from nightmares since childhood) were compared to 12 persons who had no nightmares but reported vivid dreams and 12 persons who reported neither nightmares nor vivid dreams. The two control groups were included to examine whether or not the hierarchy (ordinary dreams, vivid dreams, and nightmares) corresponds to a similar continuum on the level of personality characteristics. The participants underwent psychological

testing (MMPI, Rorschach, selected cards from the Thematic Apperception Test, and Rotter Locus of Control Scale) and an in-depth clinical interview of about 1½ hours. The videotaped interview and other materials were then scored on a blind basis: The scorer was unaware to which of the three groups the person belonged. Detailed information was secured about the family history (incidence of sleep disorders and of physical and mental illness in the relatives).

The 12 nightmare sufferers differed greatly from the other two groups (vivid dreamers and ordinary dreamers) but were very similar to the 38 nightmare sufferers from the previous study by Hartmann's team. An interesting feature with respect to sleep patterns was noted by Hartmann in the pooled group of the 50 nightmare sufferers (38 from the previous study and 12 persons from the controlled study; see Hartmann, 1984). Although no sleep problems or disorders other than nightmares were noted, they reported that they frequently were unable to tell whether they were asleep or awake for some time after awakening in the morning.

In the controlled study, the 12 nightmare sufferers as a group had significantly more frequent history of mental illness, of "artistic sensitivity" in childhood, and appeared to have more markers of vulnerability to schizophrenia in their childhood than the other two groups (i.e., the vivid or ordinary dreamers free of nightmares). Whereas the two control groups had no pathologically elevated mean T-scores on the MMPI (all T-scores

were equal to or lower than 65) and the two mean profiles were strikingly similar, the nightmare group had an elevated profile (in order of decreasing T-scores on the standard MMPI scales; Sc = 78, Pd = 74, Ma = 73, F = 72, Pa = 70): persons in the nightmare group scored higher on psychotic scales, and their K (Correction) and Ego Strength scores were significantly lower (see Hartmann et al., 1981). There was no significant difference between the nightmare sufferers group and the two control groups on the neurotic triad of the MMPI (Hs, D, and Hy scales) and on Exner's Rorschach scores. However, when scored for problems in the area of boundaries or penetrations, the nightmare group scored significantly higher on the category "boundary deficit" (Hartmann, 1984).

The nightmare group was also evaluated with respect to aggressive tendencies because some clinicians might interpret violent themes often found in the nightmare content as indicative of a misdirected or self-directed aggressive drive inherent to the dreamer. However, responses to selected cards of the Thematic Apperception Test (TAT) indicated that the nightmare sufferers were not more hostile, aggressive, or violent than the controls (Hartmann et al., 1984).

In summary, the results from the controlled study were very similar to the conclusions from the previous research by Hartmann's team. Both studies indicate that nightmare sufferers are neither neurotic nor hostile aggressive persons. They are open, sensitive, artistic, and borderline or potentially psychotic.

Hartmann (1984) frequently comments on nontraditional lifestyle, artistic propensities, and openness to unusual inner experiences clinically noted in his interviews with the volunteers in the nightmare group. He suggested that the unusual openness to untraditional experiences can be of advantage in allowing insights into one's own mental content and processes--both in oneself and in others--making the person a better artist or therapist. The ability to temporarily ignore conceptual boundaries is also essential to scientific and artistic creativity--the ideas or images are combined in innovative ways. Regression to the point of merging conflicting concepts or ideas may be easier for persons with thin boundaries. However, keeping this regression in the service of the ego may be more difficult for the nightmare sufferer than it is for others. Hartmann suggested that if frequent nightmares continue after the age of 8 or 10, this should be considered a sign that the child is vulnerable to schizophrenia: Special attention is needed in such cases. He suggests that early identification and special training could allow persons in this category to convert their weak points into creative assets: "If we can identify these at-risk people, we may be able to help them --in structuring reality, in developing a particular artistic talent, in bearing pain without losing touch with reality and people, and perhaps help in the form of medication. Help in these various forms may prevent a schizophrenic outcome and allow positive potential to emerge" (p. 168).

In spite of his using two control groups, Hartmann's (1984) research could be biased due to his method of recruiting the participants. It is possible that nightmare sufferers who do not respond to newspaper ads differ from those who willingly do in respect to some important personality characteristics, e.g., in respect to MMPI scores or Rorschach responses. Therefore, it is important to study the differences between nightmare sufferers and nonsufferers in groups recruited in other ways, for example, in alcoholics tested on admission to alcoholism treatment. To evaluate similar MMPI profile differences in alcoholics is an especially difficult test of Hartmann's theory because the MMPI pathology associated with chronic alcohol abuse could override the differences otherwise expected between nightmare sufferers and nonsufferers. A recent study by Cernovsky (1985) was carried out for this purpose. Eighty-six chronic alcoholic males (mean age 38.7 years, $SD = 13.3$; mean number of years of formal schooling 11.0, $SD = 2.0$) admitted for a four-week inpatient alcoholism treatment program at St. Thomas Psychiatric Hospital in Ontario were administered the Raven's Standard Progressive Matrices (Raven, 1960), Clarke-WAIS Vocabulary Test (Paitich & Crawford, undated), and the MMPI. The Matrices are a measure of skills in the area of visuo-spatial reasoning. The Clarke-WAIS is a multiple choice version of the vocabulary subtest of the Wechsler Adult Intelligence Scale (Wechsler, 1955). All patients had been detoxified prior to admission; the tests were

administered within four days of admission to treatment. Thirty-three patients in this sample were also addicted to drugs other than alcohol.

Twenty-two (25.6%) responded with "True" to item 31 ("I have nightmares every few nights") of the MMPI. The remaining patients marked the item "False". The proportion of the former was significantly higher ($\chi^2 = 6.7$, $p < .01$) than in a representative sample of 133 normal U.S. Midwest males between 30 and 39 years old: Only 12% of the normals indicated frequent nightmares by their response to item 31 of the MMPI (see normative MMPI data recently collected by Colligan, Osborne, Swenson, & Offord, 1983).

Patients who responded with "True" to item 31 did not significantly differ (t -tests, $p > .05$, two-tailed) from the other alcoholics in respect to age, education, their performance on visuo-spatial reasoning tasks, and average T-scores on the standard MMPI scales. In the t -tests, the Infrequency scale was compared without the score on item 31. This measure was not necessary with the other MMPI scales because only the Infrequency scale includes item 31. Both the vocabulary raw scores and IQ equivalents of the vocabulary scores were lower in nightmare sufferers than in the other patients (t -test, $p < .05$, two-tailed), however, the difference is not sufficiently large to be of clinical relevance (IQ equivalent of 100.6 in the former and 105.3 in the latter group). No significant differences were found in respect to the average elevation of the MMPI profile (sum of T-scores on all clinical scales except Masculinity-Femininity,

divided by their number, i.e., 9) mean elevation of the psychotic and the neurotic triad (see Dahlstrom, Welsh, & Dahlstrom, 1972), and in respect to T-scores on three research scales of the MMPI: Welsh's (1956) Anxiety and Repression Scales, and Barron's (1953) Ego Strength Scale (t -tests, $p > .05$, two-tailed). Raw scores on the MacAndrew (1965) Alcoholism scale (t -test, $p > .05$, two-tailed) and the proportion of patients with an exclusive addiction to alcohol ($\chi^2 = .08$, $p > .05$) were also similar in the two groups.

In further analyses, the differences on the four standard MMPI scales found as relevant by Hartmann (1984), i.e., on Schizophrenia, Paranoia, Psychasthenia, and Infrequency, were reevaluated in one-tailed t -tests, because clear-cut expectations could be held in respect to the direction of the findings. Significant difference was found only on the Psychasthenia Scale. The difference was in the expected direction: Frequent nightmare sufferers could be described as more highstrung, prone to worry, self-doubt, and irrational fears (see MMPI interpretations by Lachar, 1974).

Although this study suggested that, in chronic alcoholic men, the addiction related psychopathology indeed might override most of the MMPI profile differences found by Hartmann (1984), a more recent replication study (Cernovsky, 1986) on female addicts to alcohol and other drugs found MMPI patterns similar to those predicted by Hartmann's theory. Seventy-eight women (mean age 35.1 years, $SD = 10.5$) participated in this

study. The design was very similar to the previous investigation on male alcoholics. Both samples were drawn from the clientele of the same addiction treatment centre in Southwestern Ontario. In the group of addicted women, 24.4% marked with "True" the item 31 of the MMPI ("I have nightmares every few nights"). The proportion is significantly higher than in normative MMPI data of normal U.S. Midwest women published by Colligan et al. (1983): Only 8.2% of the latter marked the item with "True". The female alcohol and drug addicts who marked the item with "True" differed from those responding with "False" by higher scores on Schizophrenia, Psychasthenia, Paranoia, Anxiety, Depression, Psychopathic Deviate, and Social Introversion scales, and by lower scores on Ego Strength scale--the nightmare sufferers consistently scored in a more pathological direction. The average profile elevation was higher in the former (average T-score on clinical scales = 71.4) than in the latter subgroup (average T-score = 65.0).

Three of the findings were of special clinical salience: The differences between women who reported frequent nightmares and the other women were sufficiently large on the Schizophrenia (average T-score of 77.1 for the former and 66.9 for the latter) and Psychasthenia scale (average T-score of 74.6 for the former and 65.7 for the latter) and with respect to the average profile elevation (average T-score of 71.4 for the former and 65.0 for the latter) to be of clinical relevance. The differences suggest that in our sample of addicted women, those reporting frequent

nightmares had more problems in forming or maintaining warm close interpersonal relationships, were more tense, and generally likely to display more psychopathology. The statistically significant differences on other scales provide some evidence that the nightmare sufferers could also be seen as more mistrusting or insecure and touchy; apprehensive; anxious; unhappy; freedom loving; likely to experiment with their lives; avoiding traditional routes; and not adhering to traditional values. They could also be seen as less sociable.

The findings stand in line with Hartmann's (1984) MMPI research. It is, however, not clear why similar differences on MMPI scales were not found in Cernovsky's (1985) study on male alcoholics. Replicatory research is needed to determine whether Hartmann's findings are consistently not replicable in male alcoholics but replicable in female addiction treatment patients. A weakness of both studies by Cernovsky lies in their reliance on response to item 31 of the MMPI as an indicator of frequent nightmares. Further research with more differentiated criteria of nightmare incidence is being planned.

The preceding review of studies on personality of nightmare sufferers suggests that, in presumably normal life situations, high reported nightmare frequency is significantly associated with high levels of anxiety, low ego strength, feelings of being overwhelmed by stress or pressures outside of one's own control, guilty or anxious distractible daydreaming style. It occurs in persons with higher reported incidence of other sleep disorders,

and in persons who are likely to experience considerable stress as a result of their longstanding failure to develop stable close interpersonal relationships (i.e., persons with schizophrenic or schizoid signs). It may be noted that the characteristics could be interpreted as falling into two categories: (a) inadequate coping strategies or resources, and (b) symptoms frequently seen in persons undergoing extreme stress (i.e., anxiety and breakdown of some constructive coping strategies). In this sense, the review is suggestive of an underlying relationship of nightmare reports to stressful events. However, the reviewed studies did not cover a sufficiently wide spectrum of potentially relevant personality variable: Future research in this area could be very fruitful. At present, the reviewed results need to be interpreted with much caution.

Similar caution should be exercised when evaluating the results of studies dealing with personality characteristics of insomniacs. As in the preceding review of personality studies of nightmare sufferers, the following review is primarily restricted to research with standard psychological tests or with research tools allowing a replication study.

Marks and Monroe (1976) studied 53 adolescent poor sleepers --disturbed adolescents referred for treatment; insomnia was a primary or secondary reason for referral. Only those adolescents were selected for the study whose psychotherapist Q-sorted the item "complaints of difficulty in going to sleep" as "most characteristic" of the S (p. 245).

This group of poor sleepers was compared to a group of 778 other emotionally disturbed adolescents. In this comparison, the ratings by psychotherapists on 680 personality descriptors were used. The most salient differences between the two groups showed the following pattern: The poor sleepers seemed to be more anxious, fearful, phobic, reserved; obsessed with specific topics; more often depressed; and seemed to have greater difficulty concentrating. They were also described as having more multiple neurotic symptoms. The differences were significant.

Starker and Hasenfeld (1976) found significant positive correlations between reports of insomnia and both the guilty dysphoric daydreaming style ($r = .29, p < .001$) and the anxious distractible style ($r = .29, p < .001$). A very low negative correlation between the positive vivid daydreaming style and insomnia failed to achieve the conventional level of significance ($r = -.10, p > .05$). The three daydreaming styles were described in details earlier in this report (cf., the section on personality correlates of nightmares).

Kales, Caldwell, Preston, Healey, & Kales (1976) studied MMPI profiles of 128 adult insomniacs who were seeking treatment for their disorder in a treatment centre or who responded to advertisements for subjects with insomnia. Four Ss were excluded because of high scores (raw score of 22 or higher) on the F scale. Eighty-five percent (i.e., 105) of the Ss had one or more scores in the pathological range on the following eight

scales: Hs, D, Hy, Pd, Pa, Pt, Sc, and Ma. The largest percentage of the Ss had their highest elevation on the Depression scale (33%). For any of the remaining seven scales listed above, the corresponding percentages of Ss were much lower, ranging from 13% (Pd) to 5% (Hs). The majority of all Ss (61%) had their scores on the Depression scale in the pathological range. Corresponding percentages for some of the other scales were, in rank order, 46% (Hy), 44% (Pd), 42% (Pt). For the remaining scales, the percentages ranged from 36% to 20%.

Thus, the Depression scale seems to dominate the data. When profile codes were used as a means of analysis, the authors were able to distinguish among the following four depression patterns (p. 1130):

1. 2-7-8 code type (i.e., D, Pt, Sc), characterized by a chronic, ruminative depression and a schizoid identity confusion.

2. 2-3-1 code type (i.e., D, Hy, Hs), reflecting a somatized depression with inhibition and repression ("smiling depression").

3. 2-7-4 code type (i.e., D, Pt, Pd), associated with anxiety and depression in a passive-dependent modality.

4. A combination of the scales 2, 4, and 8 (i.e., D, Pd, Sc), characterized by estrangement, alienation, distrust, self-destruction, poorly socialized behaviour, negative self-image, and recurring episodes of depression and anxiety.

The relatively high percentage of pathological elevations on scale 3 (Hysteria) shows an association of insomnia to

repression, inhibition, and the incidence of various types of pains or other conversion symptoms lacking a sufficient organic basis.

Another scale on which the insomniacs very often scored in the pathological range (44% of the Ss) was Pd. This scale is often considered to indicate a potential for acting out or aggression. However, this scale was typically elevated in combination with scales 2 (D), 3 (Hy), 7 (Pt), and 8 (Sc). Thus, Kales and his co-workers interpreted the Pd scale elevation not as indicating a pattern of aggressive acting out but rather as associated with "passive-dependent and depressed passive-aggressive combinations" (p. 1130). It is interesting to note that, among other findings, Marks and Monroe (1976) also reported, in their study on adolescent sleepers, that the poor sleepers were less likely (than the other emotionally disturbed adolescents) to be described as provocative, resentful of authority figures, flippant in word and gesture, and to be referred by the court; they were more likely to be described as shy, sensitive, quiet, silent, slow, reserved, formal, fearful, worrisome, etc. This type of description stands in line with interpretations offered by Kales and his co-workers.

Kales and his colleagues also studied the differences between "younger Ss" (less than 30 years old) and "older Ss" (more than 30 years old). The older group scored higher on scale 2 (D) and lower on scale 7 (Pt) than the younger group. Extensive analysis of the profile data on different age levels

led Kales and his colleagues to the conclusion that despite the normal age related shifts, "the insomniac profiles at all age levels are primarily confined to personality types that are characterized by internal ways of handling stress, that is, by depression, apprehension, inhibition, rumination, and an inability to discharge anger outwardly." (p. 1133).

The elevation on the D scale of the MMPI also dominated the insomniac profile in a more recent study by Kales, Caldwell, Soldatos, Bixler, and Kales (1983). The authors compared MMPI scores of 279 chronic insomniacs with scores of 97 normal controls. The latter had significantly lower scores on all clinical scales except the *Mf*, *Si*, and *Ma* scales. The MMPI profile based on average scores of the insomniac group could be described by listing the first four profile peaks in order of their decreasing T-score values: *D* = 71.6; *Pt* = 67.7; *Hy* = 66.8; and *Sc* = 66.4. Only a few MMPI code types accounted for about one half of the MMPI profiles in the insomniac sample. The profiles were interpreted as showing neurotic depression, rumination, chronic anxiety, inhibition of emotions, and an inability to discharge anger outwardly.

Coursey, Buchsbaum, and Frankel (1975) reported data from a large scale comparison of personality measures on a group of 18 insomniac *Ss* and 18 sex- and age-matched normal controls. All insomniac *Ss* were taken off any sedatives and hypnotics at least four weeks before entering the study. Results related to the following personality measures and their derivatives are reported:

the MMPI, WAIS, Edwards' Social Desirability (SD) Scale, Zung's Depression Scale, Eysenck's Neuroticism, Extraversion and Lie, Zuckerman's Sensation Seeking Scale (SSS), Taylor's Manifest Anxiety Scale (MAS), etc. Moreover, the average evoked responses (AER's) to auditory and visual stimulation of different intensity were compared for the two groups of Ss.

The two groups significantly differed above all on the following measures: The insomniacs scored higher both on the Zung's Depression Scale and on the MMPI D scale; they also scored higher on Eysenck's Neuroticism Scale as well as on MMPI Hs, Hy, and Pt scales. They also scored higher on Byrne's Repression-Sensitization (RS) Scale (i.e., more toward the sensitization end) and on Taylor's MAS. As is generally known, the sensitizing end of the R-S dimension is indicative of special types of internal defense mechanisms as a means of coping with psychological stress; the use of mechanisms such as intellectualization, obsessiveness, and rumination. The other end of the dimension is characterized by the use of mechanisms such as denial, repression, and rationalization (cf., Byrne, 1961; Chabot, 1973).

On the other hand, the insomniacs scored lower on the Zuckerman's SSS. No significant differences were found on Eysenck's Extraversion and on the MMPI Pd, Pa, Sc, L, Mf, K, Si, Sc, and Ma scales.

Thus again, the results present us with a picture of the insomniac as a depressed, anxious, and worried person. The differences on the Zuckerman's SS scale, considered together with

high scores on the Hs scale and with the tendency to conversion reactions (as implied by the Hy scores) seem to indicate a tendency to be anxiously preoccupied with somatic functioning, associated with a tendency to seek internal rather than external stimulation (cf., also Coursey et al., 1975, p. 243). However, these characteristics do not have any implications for the introversion-extraversion dimension since the insomniac and the control group did not significantly differ on the Eysenck's Extraversion scale.

The examination of the AER's (to visual stimuli ranging from 2 to 240 footlambert, i.e., 7 - 825 candela/m²; and to auditory stimuli ranging from 50 to 80 db) showed that the insomniac Ss were less reactive to auditory but not to visual stimulation. Coursey and his colleagues hypothesized that being less reactive to external auditory stimulation might be one of the causative factors in insomnia. According to their line of thought, the insomniacs typically engage in anxious obsessive worrying at the time when other sleepers would move "from a reality oriented, problem-solving type of thinking to a hypnagogic hallucinatory type of mentation" (p. 247).

This active type of bedtime rumination could be stopped if the attention were diverted to some repetitive auditory stimulation such as music, monotonous tones, or white noise, which, in turn, could induce more "passive" type of cognitive activity--the hypnagogic fantasies, typical for the normal mentation pattern of falling asleep (cf., pp. 246-247).

Elenewski and Carrera (1979) administered a questionnaire about sleep habits to 682 psychology students. Subsequently, they compared the extreme groups of 36 "good sleepers" and 49 "poor sleepers". The latter reported always needing more than 40 minutes to fall asleep, waking up at least once at night, difficulties in falling asleep, and waking up unrefreshed. The former reported never needing more than 15 minutes to fall asleep, waking up rested in the morning, and, as a rule, never awakening during the night or having difficulties maintaining sleep. Of the clinical scales of the MMPI, all except Paranoia (Pa) and Hypomania (Ma) scales were more elevated in the group of poor sleepers: The Depression scale discriminated most strongly between the two groups.

Special attention should, however, be paid to personality differences on MMPI scales between sleep onset and sleep maintenance insomniacs. If sleep maintenance insomnia is more closely linked with incidence of nightmares than is sleep onset insomnia (as suggested in psychodynamic theories outlined or reviewed by Beutler et al., 1978), then it is possible that the MMPI profiles of sleep maintenance insomniacs differ from those of sleep onset insomniacs in a greater prominence of the Schizophrenia and other psychotic scales and lesser prominence of the Depression and other neurotic scales of the MMPI. Elevations of psychotic scales are more characteristic for REM nightmare sufferers and elevations of neurotic scales for insomnia sufferers (see the preceding review of literature or

Hartmann, 1984). If there is indeed a relative shift in the sleep maintenance group from the profile peaks on the neurotic triad of the MMPI towards profile peaks on the psychotic triad, especially on the Schizophrenia scale, then this could indicate that sleep maintenance sufferers are more similar to REM nightmare sufferers than are sleep onset insomniacs. Data from a study by Beutler et al. (1978) suggest a similar difference in MMPI measures. However, their comparisons of sleep onset and sleep maintenance insomniacs were based on small numbers of persons only: Replications of their study on larger groups are needed.

The present study approaches this problem from another direction by evaluating, in an exploratory manner, the difference in the magnitude of the correlation coefficient computed between reports of nightmares and reports of sleep maintenance insomnia and of the coefficient computed between reports of sleep onset insomnia and reports of nightmares (see result section).

To summarize the studies on personality correlates of insomnia, insomniacs could be described as more depressed, anxious, ruminative, and as internalizing negative emotions such as anger. Similarly, to summarize studies of personality correlates of nightmare frequency, frequent reports of nightmares are associated with high levels of waking anxiety, with impaired ability to constructively deal with stressful events (as suggested by low ego strength scores) with feeling overwhelmed by stress or pressures outside one's own control, and with an increased

incidence of schizoid or schizophrenic signs. Thus, the characteristics of nightmare or insomnia sufferers do not seem to provide material for hypotheses which could rival those linking sleep disorders to stressful events. On the contrary, research in this area points out that the most frequent personality correlates of reported sleep disorders are either personality characteristics relevant for efficacious coping with stress or characteristics which could be conceived as possible consequences of stress. From this viewpoint, the results of studies of personality correlates of sleep disorders are not dissonant with the hypotheses presented in the next chapter.

3. Goals, Methods, and Hypotheses of the Present Study: Theoretical Considerations.

3.1 Goals and methods. The review of related publications suggests that, at least for some events or in some persons, (a) stressful events might disrupt sleep, and (b) the content of emotionally intensive presleep experiences might be significantly related to the content of subsequent dreams. The research in this area seems to be in a methodological dilemma. The choice of more exact sleep laboratory methods is usually associated with the use of too benign stressors to produce significant pressure to result in insomnia or nightmares. Furthermore, nightmares might be more rare in the sleep laboratory than in home settings. For example, persons with posttraumatic nightmares were reportedly suffering from their nightmares less frequently when

in the sleep laboratory (Hartmann, 1984). Some of the sleep laboratory studies included substantial real life stressors such as exams for medical students or, for patients of a general hospital, the anticipation of surgery for cancer. However, the numbers of subjects in similar studies tend to be too low for statistical inference. Moreover, it is possible that the frequent contact with the research staff (interviews, psychological testing, explanations of sleep laboratory procedure) provide some emotional comfort for the participants and alleviate or modify their reactions to stress. The use of planned major stressors and/or minimizing supportive interventions by the research staff would, however, obviously be unethical.

In spite of much research effort, the main bulk of evidence of an impact of major stressors on sleep or dreams is chiefly derived from relatively unsystematic clinical observations and intuitions. The clinicians may see a biased sample of the population, i.e., only persons who developed major psychopathological symptoms upon exposure to stress and/or who have been unstable already prior to the stress. The clinical observations and lore might fail as descriptors of psychodynamics in persons outside of psychiatric settings.

Another problem lies in the very nature of available data in clinical settings. The clinician may lack objective information to corroborate the patient's retrospective reports of recent stressful events and sleep disorders. Regardless of

the real incidence of the stressful events and of sleep disorders, however, it is interesting to know whether the subjective reports of stress and sleep disorders are indeed statistically significantly associated.

Unusually little or no time is available in clinical settings to systematically gather data for a statistical analysis of the relationship between reports of stressful events and reports of recent sleep disorders. Maybe the analysis would show no systematic relationship. The present study is meant as a first step to provide statistical data with respect to the relationships of the two sets of retrospective reports. The goal was to evaluate the magnitude of correlational relationships between the two sets of variables.

A major problem of this investigation laid in choosing adequate measures of reported events from the waking life. The measures need to be comprehensive and to sample primarily events occurring with similar likelihood in the life of adults regardless of their sex, ethnic background, or educational and economical level. Measures which would overestimate the stress level of one population group and underestimate the stress to which some other groups are exposed would jeopardize the accuracy of statistical assessment needed to test the first hypothesis of the present study. Many questionnaire measures of incidence of stressful events are available and the majority seem to suffer from methodological problems described in detail elsewhere (Dohrenwend & Dohrenwend, 1974; Monroe, 1982a, 1982b).

The present study is based on a replicatory approach:

Two different measures of reported life events were used. Each was administered to a different group of persons. The replication thus included a variation in the method. (See procedure section of the Study I and Study II.)

Both measures, however, were questionnaire measures, i.e., lists of potentially stressful events. The two lists include not only unpleasant or upsetting but also pleasant events as long as the event requires major adjustmental effort from the individual and thus eventually may tax his or her adjustive resources. The rationale for the inclusion of positive events in the list of stressful events has its background in early research by Holmes, Rahe, and their co-workers. They recorded events in the life of over 5,000 patients and noticed that, prior to or at the time of disease onset, some patients experienced events which are commonly viewed as desirable or pleasant (e.g., raise in salary) rather than aversive. It was concluded that the important pathogenic factor is the amount of change rather than its aversive or undesirable nature (see Holmes & Masuda, 1974; Rahe, 1974). According to Rahe, several of his studies show that life change scores based on positive events are positively correlated with subsequent reports of illness (Rahe, 1974).

The two questionnaires were the Social Readjustment Rating Scale (Holmes & Rahe, 1967), which was also used in the insomnia study by Healey et al. (1981), and the Life Events Inventory

(Tennant & Andrews, 1976). The Social Readjustment Rating Scale was chosen because it is widely used, which allows the comparisons of present findings to results published by other investigators, such as correlations of the Readjustment Scale scores to symptoms other than sleep disorders (see an anthology by Dohrenwend & Dohrenwend, 1974). . The Life Events Inventory was selected because this list of events can be scored in several manners: for the extent of life change, amount of distress, and for the degree of control or choice over the incidence of the event. Although many investigators (Holmes & Masuda, 1974; Rahe, 1974; Wildman & Johnson, 1977) reported that their data indicated that the amount of life change per se rather than the desirability of the event is the decisive element in the illness-generating impact of life events, there is also evidence at present that undesirable events are more closely associated with the occurrence of pathology than are desirable events (Crandall & Lehman, 1977; Duckit & Broll, 1983; Mueller, Edwards, & Yarvis, 1977; Paykel, 1974; Sarason, Johnson, & Siegel, 1978; Vinokur & Selzer, 1975). The Social Readjustment Rating Scale is not well suited for comparisons of the impact of any life change with the impact of negative life changes specifically. Although the inventory includes some clearly aversive events and their relationship to insomnia has already been documented elsewhere (Healey et al., 1981), the number of clearly negative events might be too small to allow comparisons of the impact of undesirable life change with life change generally. This

complication is avoided when the Life Events Inventory is used in similar comparisons.

Another advantage of the Life Events Inventory, as mentioned earlier, is its inclusion of scales measuring the degree of control over events. The degree of control has significantly differentiated between suicide attempters and normals, in respect to the type of events experienced by the two groups (Paykel, Prusoff, & Myers, 1975). Lack of control over events could also be associated with higher frequencies of sleep disorders. An additional goal of the present study is to explore this possibility.

As mentioned earlier, the Readjustment Scale (Holmes & Rahe, 1967) was developed to measure the amount of life change only, regardless of its quality. Each item was assigned a weight according to the amount of readjustment required by the event. For example, the weighted score for a divorce is 73 life change units (LCU) and for pregnancy 40 LCU. The weighted scores were developed by averaging item ratings by 394 participants who consisted primarily of white protestant middle class North Americans. Subsequent studies showed that other samples rated the items in a comparable manner. For example, ratings by students (average age of 18) highly correlated with the ratings by the original sample (Spearman's rho was .97)-- see Ruch and Holmes (1971).

A similar procedure was also used by Tennant and Andrews (1976, 1977) to develop their scoring system for the Life

Events Inventory: One-hundred and fifty-one Australian adults were instructed to rate the items for amount of change and also for amount of distress. Recently Zeiss (1980) used this procedure to derive aversiveness weightings for the Readjustment Scale of Holmes and Rahe. Her subjects were 57 young college students (median age between 18 and 19) enrolled in an undergraduate personality course at the University of Oregon. Their ratings were found reliable in a replication of the procedure after one to two weeks ($r = .99$). Although the group was small and perhaps unrepresentative, and, although the number of unambiguously aversive events in the Readjustment Scale is small, her aversiveness scores were tentatively used in the present study in order to provide more data on her scoring system. It should be emphasized, however, that her innovative approach represents a radical departure from the theoretical standpoint defended by Holmes and Rahe (1967), namely from the doctrine that the amount of change, not the extent of aversiveness, is responsible for the stressful impact of life events.

Many researchers have found that working with unweighted scores for life change (each event, regardless of importance, being assigned one point) leads to equally good (or superior) results as does differential weighting of events (Paykel et al., 1975). This stands in considerable contrast with the effort of others, e.g., the authors of the Readjustment Scale and Life Events Inventory, to weight the events. To provide more data

on this controversial issue, effects of weighted and unweighted scores were compared in the present study. The use of both weighted and unweighted scores is likely to appear as clinically irrelevant; however, such comparisons are badly needed for advancing knowledge of event-illness associations (cf., a review of life events assessment by Monroe, 1982a).

Many types of life event scores were included in the present study, with the goal of evaluating their relationship to self-reported incidence of sleep disorders. The group of sleep disorders included nightmares (defined in questionnaire items as "any frightening dream"), difficulty falling asleep, waking up at night, unrefreshing sleep, and restless (not quiet) sleep. The latter four categories of sleep disorders were already discussed in some detail in an earlier section of this dissertation. They were chosen as variables for the following reasons. Evidence for the importance of a distinction between sleep onset and sleep maintenance insomnia comes from factor analytic research by Evans (1977). He analyzed responses of 272 male volunteer college students to a 33-item questionnaire consisting of questions about sleep and sleep habits. The factor analysis was independently performed on two subsamples (92 and 180 students) and then the two sets of factors were matched. A comparison of the two sets of factor loadings was carried out via correlational analyses: The correlations "were mostly very high" (p. 562). When the correlations between factor loadings for all 33 questions for a given factor in the

first subsample and the corresponding factor in the second subsample were compared with its correlations to other factors in the second subsample, the former were always higher than the latter. Two factors (out of the five reported) were directly related to insomnia: One was labelled "sleep onset difficulty" and the other "difficulty maintaining sleep". The first factor was formed by items describing difficulty in falling asleep, difficulty in falling asleep particularly before examinations or similar important events, inability to fall asleep easily or at will, the use of sleeping pill, etc. The second factor dealt with sleep characteristics such as awakening during the night, awakening to an unexpected sound, difficulty in sleeping in strange surroundings, having to get up during the night, etc. Unfortunately, the study by Evans was not carried out on a group of insomniacs. Possibly, if insomniac Ss had been used and if the questionnaire had covered a greater range of different insomniac symptoms or complaints, some other insomniac factors would have been found, for example, factors related to unrefreshing sleep and to disturbed, restless sleep.

Complaints about unrefreshing sleep are, on the one hand, more typical of older insomniacs, possibly due to the lesser percentage and/or absolute amount of delta sleep (Coursey et al., 1975, p. 241; Frankel et al., 1976, p. 620): Delta sleep was hypothesized to be involved in organismic processes of somatic recovery or restoration. Nevertheless, this issue is unclear, since delta sleep suppressants such as diazepam (Valium) do not

lead to complaints about unrefreshing sleep (Frankel et al., 1976, p. 621). On the other hand, complaints about an unrefreshing sleep are also typical in neurasthenics, i.e., they occur also in young adults since, in a mild form, neurasthenic neurosis is relatively common among young adults (Coleman, 1976, p. 251). According to Coleman, the neurasthenic "usually spends a good deal of time sleeping in an attempt to counteract fatigue, yet regardless of the amount of sleep he gets, he awakens unrefreshed" (p. 251).

Complaints about not quiet, restless sleep may be closely related to the incidence of some other sleep disorders, above all to nightmares, bruxism, sleep talking, and high muscle tension. The two patterns, complaints about unrefreshing sleep and complaints about not quiet, restless sleep are probably highly correlated.

Thus, in addition to reported nightmare frequency, four types of insomniac complaints were studied as separate variables in the area of sleep disorders. The variables in the present study can be visualized as belonging to two separate sets shown in Table 1. The first set includes variables based on the incidence of reported stressful life events and the second the sleep disorder variables.

The goal of the present study is to evaluate the relationship between the two sets of variables.

Table 1

Basic Variables in the Present Study

I Reported stressful events:

Social Readjustment Scale:

1. Total number of events
2. Number of aversive events
3. Weighted scores for life change
4. Weighted scores for negative events
5. Score for aversive events according to system proposed by Zeiss (1980)

Life Events Inventory:

1. Total number of events
2. Number of aversive events
3. Weighted score for life change
4. Weighted score for aversive change
5. Weighted score for aversive events
6. Number of positive events
7. Weighted score for positive events
8. Unweighted difference between number of negative and positive events
9. Their weighted difference
10. Scores for amount of control over events

II Reported sleep disorders:

Nightmares:

1. Reported frequency of nightmares

Table 1 - continued

Insomniac complaints:

1. Complaints about sleep onset insomnia
2. Complaints about sleep maintenance insomnia
3. Complaints about unrefreshing sleep
4. Complaints about restless sleep

The choice of methods usually involves considerations of the validity and reliability of instruments. The present study is somewhat exceptional in that much less emphasis is placed on the validity or reliability of the questionnaire self-reports of incidence of stressful events and of sleep disorders and in that the focus is centred on evaluating the magnitude of the correlational association between the two types of retrospective self-reports regardless of the real underlying incidence of the waking life events and of sleep disorders. The rationale of this choice was explained in more detail in the introductory section of the study.

Nevertheless, a few comments on the validity and reliability of the methods follow with a focus on the true underlying incidence of sleep disorders and of stressful events. With respect to the validity of self-reports of sleep disorders, the relationships of self-reports of insomniac problems to somnographic measures in sleep laboratory settings show, in most persons, at least some differences between the two sets of variables (see a review by Beutler et al., 1978;

Carskadon et al., 1976; Frankel et al., 1976). This was discussed in greater detail in preceding sections of this report. The validity of self-reports of nightmares is more difficult to assess. It has been pointed out by Hartmann (1984) that nightmares might be less frequent in the sleep laboratory than in home settings. It is not clear whether this is due to a real decrease in incidence of nightmares in the laboratory settings or to overestimates of nightmare frequencies in home settings by the subjects. It is possible that, in some persons, the overestimates of nightmare frequencies parallel those of (or are comparable to overestimates of) sleep latencies, or of the ratio of total sleep time to time in bed trying to sleep in chronic (subjectively defined) insomniacs: Hopefully, future studies will provide more information on this issue.

Validity of self-reports of stressful events is difficult to evaluate. Brown, Sklair, Harris, and Birley (1973) have shown that, in respect to major events, the agreement between patients and independent informants might be quite high when the interview method is used to collect life event data. The results of a study by Rahe, Romo, Bennett, and Siltanen (1974) are more difficult to interpret. The subjects were myocardial patients: Their spouses provided parallel information about the incidence of events in the life of the patient. Four different correlations (ranging from .75 to .07) were obtained: Rahe and his co-workers attempted to explain the discrepancies by the presence of the mechanism of denial. However, regardless of the

size of the coefficients, the validity research based on parallel informants is obstructed by the possibility that both the self-reports by the subjects and by the informants might be inaccurate or that the reports by the informants could be less accurate than the reports by the subjects.

Content validity issues involve consideration of the selection of the events for the life event questionnaires. An unsolved problem remains the issue of adequate sampling, comprehensiveness, and weighting of event lists (Dohrenwend, 1974; Dohrenwend & Dohrenwend, 1974; Dohrenwend, Krasnoff, Askenasy, & Dohrenwend, 1978). As mentioned earlier, Holmes and Rahe selected the events for their inventory on the basis of practical work with more than 5000 patients and developed life change weights for each event on the basis of ratings by 394 persons. Other existing inventories were developed by similar procedures (Cochrane & Robertson, 1973; Dohrenwend et al., 1978; Horowitz, Schaefer, Hiroto, Wilner, & Lewin, 1977; Paykel, Prusoff, & Uhlenhuth, 1971; Sarason et al., 1978; Tennant & Andrews, 1976). The approaches were based more on social consensus than on objective actuarial data. Techniques such as discriminant or multiple regression analysis would be methodologically more justifiable as a procedure for selecting and weighting events. However, the use of statistical approaches such as multiple regression is obstructed by problems such as the definition of the dependent variable: Illness can take on various forms (sometimes with a slow, insidious onset)

which cannot easily be converted to a common denominator: New methods would need to be developed to rate the extent of illness.

Another problem lies in the differences among subsamples of the general population. The standard lists of events developed on representative samples of the population may be poorly suited for research on specific target strata of the population, e.g., for research on the very elderly, or on recently arrived refugees from countries with military dictatorship, or on high school students in their late teens.

The majority of the past research with lists of stressful events has been based on the belief in a causal relationship between life stress and symptoms of illness (see e.g., Holmes & Masuda, 1974). Unfortunately, the studies were mostly retrospective and correlational. It is possible that persons who suffer from a major illness tend to ex post facto seek for an explanation of how the illness developed and assume that specific environmental pressures accelerated or made possible the onset of illness. They might be more clearly aware of past events and reports, but not experience, more events. The correlations between incidence of illness and of events found in similar self-report studies might be at least partly based on factors such as mental set or mood. It was, however, shown that (a) reports of life events over short time spans can be corroborated by collateral sources of information (Rahe, 1974), and (b) life event scores are not systematically related to

experimentally induced mood states (Johnson & Sarason, 1979). The correlations between events and illness symptoms remained significant when controlled for effects of social desirability (Vinokur & Seltzer, 1975).

A closer inspection of most of the currently used lists of stressful events shows that some of the events could be viewed as consequence of illness or symptoms of illness rather than causal antecedents of illness. According to Hudgens (1974), almost 70% of the items of the Social Readjustment Rating Scale may be of this type. For example, items such as marital problems, difficulties or changes at work, or financial and legal problems are frequently included in various inventories, but all of them could be a consequence of a debilitating physical or mental illness. There is, however, some evidence from cross-lagged correlational analyses that past symptoms are not predictive of future life events and that past events are predictive of future symptoms of illness (see Johnson & Sarason, 1979). At this stage of research, excluding events which could be seen as consequence of illness could be premature and obstruct the research progress because it is known that the undesirable results of stress, i.e., symptoms of illness, may subsequently function as stressors in their own right.

Although there is some support from cross-lagged correlational studies for the assumption of a causal relationship between life stress and illness, and although it has repeatedly been found that life event scores have predictive value (Cline & Chosy, 1972;

Holmes & Masuda, 1974; Popkin, Stillner, Pierce, Williams, & Gregory, 1976; Rahe, 1974), most of the correlation coefficients found for the relationship of events to symptoms are low. Moreover, nonsignificant coefficients were reported in some studies (see references in Perkins, 1982). It is possible that the currently used lists of stressful events fail to provide a sufficiently accurate measure of the amount of stress to which the person was exposed within a given time span, or that the impact of stress is modified by various external or internal factors such as social support systems, personal coping skills, or some yet unknown variables. The low size of the correlation coefficients could also be expressive of the possibility that, in many cases, exposure to stress is desirable rather than undesirable because it forces the person to exercise and/or improve various psychophysiological coping skills. Thus, the long-term outcome of some levels of exposure to some types of stress could be a relative absence of symptoms of illness.

With respect to reliability of life event questionnaires, test-retest studies indicate that a large proportion of the originally checked items might be forgotten on retest (Jenkins, Hurst, & Rose, 1979). The personality type of the respondent probably affects the magnitude of the reliability coefficients. For example, the highest test-retest coefficients were found with graduate students in psychology, and lowest with brewery workers (see Rahe, 1974). For this reason, the selection of the subjects has much impact on the research outcome and on the

interpretation of findings. On the theoretical level, this is also an important argument in favour of the S-O-R model in conceptualizing the process of reporting events and symptoms. The use of this model, however, would transcend the goals of the present study.

3.2 Hypotheses. Although most of the analyses in the study are exploratory, two hypotheses were formed. They were derived from the general trend of findings of the current research as described in the preceding sections of this report. The hypotheses are as follows:

1. Reports of stressful events are significantly related to reports of sleep disorders: Persons reporting more stressful events are likely to obtain higher scores on self-report measures of sleep disorders.

2. Content of reported stressful events is significantly associated with the same or similar content of reported nightmares: Persons reporting specific types of stressful events in their waking life are likely to report nightmares with similar content.

III EMPIRICAL SECTION

The research was aimed at testing two distinct hypotheses and thus is described in two separate subsections labelled as Study I and Study II, each dealing with one of the hypotheses. The procedures and statistical methods differed in the two studies, in line with the specific nature of the problems associated with the two hypotheses.

The subjects, however, were all drawn from the same population and can be described as part-time college students enrolled in bachelor's degree level courses in psychology offered by the University of Maryland. As will be shown later on, the participants in Study II are a subsample of persons who participated in Study I.

1. Study 1

This study examined the hypothesis which stated that persons reporting more stressful events were likely to report higher frequencies of sleep disorders.

1.1 Method

1.1.1 Subjects. Sample A: One hundred and seventy part-time students enrolled in undergraduate psychology courses in U.S. military settings participated. They were members of the military or family members of military staff. Their age ranged from 18 to 55 years; the mean age is described in Table 2 (see Sample A). The mean age of men was 27.7 years ($SD = 7.4$ years) and the mean age of women was 27.0 years ($SD = 6.6$ years). The majority were married (117 persons); 50 were divorced, single, separated, or widowed, and the remaining three students did not indicate their status.

Table 2

Participants in Study I and Study II ($N = 261$):

Main samples (see Sample A and B) and their
subsamples (see Sample C and D)

	Number	Age (years)		Gender	
	N	$\bar{X}$	SD	Women	Men
Sample A	170	27.4	7.0	73	97
Sample B	91	26.0	6.3	37	53
Sample C	98	26.7	6.3	50	48
Sample D	56	25.8	6.2	26	30

Legend: Sample C is a subsample of Sample A; Sample D is a subsample of Sample B.

Sample B. This group included 91 persons recruited from the same settings as members of Sample A. Their age ranged from 18 to 45 years. The mean age is described in Table 2 (see Sample B). The mean age of men was 27.1 ($SD = 6.4$ years) and the mean age of women was 24.4 ($SD = 5.8$ years). As indicated in Table 2, there were 53 men and 36 women; gender information was not indicated by one student. Fifty-two were married and 38 were single, divorced, or separated; this information was missing for one person.

1.1.2 Procedure. The participants received a questionnaire to be completed anonymously. The questionnaires were distributed to the students at the beginning of the terms (the academic year was divided into five terms) and were usually completed during their classroom refreshment periods, or at home and brought to the next classroom session. The classes varied in size from about 15 to 60 students. The questionnaires were distributed over a period of two years. Only about 70% of the questionnaires which were handed out were actually returned by the students. The participation was voluntary and did not offer any credit to the subjects.

The questionnaire administered to Sample A included:

1. The Social Readjustment Rating Scale.
2. The Lie Scale of the MMPI.
3. A set of 13 items dealing with incidence of sleep disorders and with dream recall (see Appendix I).

The instructions added to the Social Readjustment Scale indicated that every event should be checked which has occurred within the last six months; the same time span was delineated for the recall of nightmares and other sleep disorders and of nonnightmare dreams.

To indicate their nightmare recall frequency, the students were to circle a number in the following row which would be the closest to the number of nightmares they had in the last six months: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 15, 20, 30, 40, 50, or to circle a statement "more than 50 times". The dream recall frequency was assessed in an identical manner (see Appendix I, item 3). Two questions dealt with dream and nightmare content (see Appendix I, items 1 and 8): They are discussed in more detail in the procedure section of Study II.

The incidence of difficulties falling asleep, difficulties maintaining sleep, and difficulties related to restless sleep and to unrefreshing sleep was assessed by means of item 9 to 12 in Appendix I. As mentioned earlier, the instructions specified that only disturbances not caused by extremes of climate, outside noise, thirst, etc., should be reported. The frequency of each disorder, in the past six months, was to be indicated by choosing one of five answer possibilities: never (scored as 0); once or twice (scored as 1 point); nearly once a month (scored as 2); nearly once a week (score of 3); and more often (score of 4). The score value in parentheses indicates computational values assigned to answers in the analysis of the data.

The questionnaires administered to persons in Sample B differed only in that the Readjustment Scale was replaced by the Life Events Inventory and the Lie scale of the MMPI was omitted because no pathological elevations on this scale were observed for Sample A and preliminary analyses of the data on Sample A (available prior to data collection on Sample B) showed no significant correlations of the Lie scores with life event and sleep disorder variables.

Three items of the Life Events Inventory (Tennant & Andrews, 1976) had to be re-worded to apply to the situation of the U.S. students (military members stationed in another country overseas). The original inventory was developed in Australian settings and three items explicitly deal with the local geography (moving house): Item 56--You moved to Sydney from overseas; Item 57--You moved to Sydney from elsewhere in Australia; and Item 58--You moved house in Sydney. The three items were re-worded as follows:

56. You moved to this area from another country.

57. You moved to this area from elsewhere in this country.

58. You changed your residence in this area (you moved to another house in this area).

1.2 Results. Mean number of reported events was similar for the Readjustment Scale and for the Life Events Inventory: On the average, about eight events were reported. The mean values and their standard deviations for the number of events, weighted scores

for change, and the mean weighted score for distress are listed in Table 3.

Table 3

Mean scores on the Readjustment Scale ($N = 170$)
and on the Life Events Inventory ($N = 91$)

	$\bar{X}$	SD
Social Readjustment Scale		
Number of events	8.4	5.3
Number of negative events	1.1	1.0
Weighted score for life change	193.6	120.4
Life Events Inventory		
Number of events	7.8	3.7
Number of negative events	2.9	2.2
Number of positive events	1.8	1.4
Weighted score for life change	134.5	71.8
Weighted score for distress	72.5	49.2

For reasons explained earlier (see the Theoretical Section), the Social Readjustment Scale lists both negative and positive events. The theoretical rationale for this procedure was also accepted by Tennant and Andrews (1976, 1977) and, thus, the Life Events Inventory also consists both of negative and positive events. In the present study, a list of 15 clearly undesirable events from the Readjustment Scale was used as a measure of the incidence of negative events. The events in this short scale are listed in Appendix 2. All other events in the Readjustment Scale were judged either as ambiguous or as positive. The number

of positive events was too small to develop a similar measure of positive life change. However, the Life Events Inventory is more encompassing and thus both a scale consisting only of negative events, and a scale listing only positive events, were created (see Appendix 2). The average scores on the three scales are listed in Table 3. As shown in the Table, the average number of negative events reported on the Life Events Inventory was almost three times higher than on the Readjustment Scale, probably because the former lists a larger number of clearly negative events.

Average scores on sleep disorder variables are indicated in Table 4. As shown in this Table, mean number of nightmares reportedly experienced in the last six months was similar in Sample A and Sample B. The values for the incidence of insomniac complaints are also very similar in the two Samples of participants. The scores for the four types of insomniac complaints were calculated in a manner described in the procedure section. In addition to the four types of scores, a composite score was also calculated (see the heading "Insomniac complaints" in Table 4) by adding the four scores.

Table 4
Mean Scores on Sleep Disorder Variables in
Sample A (N = 170) and Sample B (N = 71)

		$\bar{X}$	SD
Nightmares	Sample A	2.7	3.6
	Sample B	3.4	6.8
Insomniac complaints	Sample A	6.6	4.0
	Sample B	6.9	4.0
Sleep onset problems	Sample A	1.7	1.2
	Sample B	1.9	1.3
Sleep maintenance problems	Sample A	1.3	1.1
	Sample B	1.5	1.2
Unrefreshing sleep	Sample A	1.9	1.3
	Sample B	1.9	1.3
Restless sleep	Sample A	1.6	1.3
	Sample B	1.6	1.3

The proportions of persons who reported no nightmare experience or no insomniac disorders were also very similar in Sample A and Sample B: See Table 5.

Table 5
Proportions of Persons Reporting No Sleep Disorder
in Sample A (N = 170) and in Sample B (N = 91)

Nightmares	Sample A	40.6%
	Sample B	40.0%
Insomniac complaints	Sample A	0.0%
	Sample B	1.1%
Sleep onset problems	Sample A	12.4%
	Sample B	11.1%
Sleep maintenance problems	Sample A	23.5%
	Sample B	20.0%
Unrefreshing sleep	Sample A	12.4%
	Sample B	14.3%
Restless sleep	Sample A	21.8%
	Sample B	20.0%

It may be noted that no person in Sample A and only one participant from Sample B claimed to experience no insomniac problems in the last six months.

For all four insomniac variables and for many other key variables in both samples, the distribution of scores was skewed and the measures were not based on interval scales. The basic assumptions for the use of Pearson r_s were violated. However, Havlicek and Peterson (1977) have recently demonstrated that Pearson's coefficients are quite insensitive to similar violations of the basic assumptions of normality and the type of measurement. In the present study, Pearson r_s were used to evaluate the size of relationships.

Women might be exposed to a different type and degree of stress than men--e.g., due to sex discrimination from some men or due to a high frequency of double career (work in employment settings and excessive childcare and household duties at home). There could be a corresponding difference in the incidence of sleep disorders. Even if the mean scores and standard deviation were comparable, the shape of the frequency distribution of the stress or sleep variables might be different. Similar considerations could justify a separate analysis of the data for men and women. However, it was obvious from the frequency distributions of the key variables in this study that the gender linked differences were, in most cases, negligible. Therefore, the data for men and women were pooled.

The major concern was the relationship of scores based on incidence of life events to scores dealing with sleep disorders. The scattergrams of the relationships did not suggest any strong curvilinear trends. Similarly, the diagrams of the various

relationships do not indicate a consistent curvilinear pattern (see Figure 1 to Figure 18, after list of references). The coefficients computed between the two sets of variables are listed in Table 6 (see first seven columns of coefficients, counting from left to right).

The relationships of sleep disorders to scores on the Readjustment Scale were weak and often nonsignificant, especially the relationships based on life change rather than on aversive life change scores. It should, however, be noted that all relationships of negative events to variables of sleep disorders were significant, and contrast with those between life change and sleep disorders. The use of unweighted as opposed to weighted life event scores did not lead to marked differences in correlational patterns.

The Life Events Inventory measures were mostly unrelated to sleep disorder scores. It is possible that the inventory includes too many ambiguous events not sufficiently related to aversive life change. To examine this assumption, the listed events were evaluated in respect to their desirability. As explained earlier, a group of 36 clearly negative events and a group of 14 clearly positive events were formed to serve as indices of negative life change and of positive life change, respectively. In addition to the two new measures, a difference index was calculated by subtracting the positive from the negative events index. The three indices were included in

Table 6

Relationship of Scores on Social Readjustment Rating Scale and Life Events Inventory to Reports of Sleep Disorders (N = 170 for the Readjustment Scale and N = 91 for the Life Events Inventory)

Sleep variables	Readjustment Scale			Life Events Inventory					Difference index				
	Negative events		Life change	Dis- stress	Negative events		Positive events						
	W+	U/W++	W+	U/W++	W+	U/W++	W+	U/W++					
All sleep disorders	.17*	.17*	.28**	.27**	.07	.06	.18*	.16	.19*	-.14	-.12	.22*	.24*
Nightmare frequency	.23**	.24**	.24**	.26**	.11	.18*	.14	.29**	.13	-.03	-.04	.28**	.13
Insomniac disorders	.12	.11	.24**	.22**	.05	.02	.15	.11	.16	-.14	-.12	.19*	.22*
Falling Asleep	.01	.02	.16*	.15*	-.06	-.06	.07	.07	.12	-.13	-.14	.14	.19*

Table 6 - continued

	W+	U/W++	W+	U/W++	W+	U/W++	W+	U/W++	W+	U/W++	W+	U/W++
Waking up	.12	.13	.28**	.24**	.09	.03	.18*	.11	.19*	-.11	-.09	.16
Unrefreshing												.22*
sleep	.14	.12	.15*	.15*	-.02	-.02	.04	.00	.04	-.17	-.13	.10
Not quiet												.12
sleep	.12	.10	.19*	.19*	.08	.03	.10	.05	.09	-.08	-.05	.09
												.10

Legend: + Weighted scores; ++ Unweighted scores; * $p < .05$ (one-tailed); ** $p < .01$ (one-tailed)

All sleep disorders is a variable formed by adding scores for insomniac complaints to the nightmare recall frequency. The weights assigned to the Readjustment Scale items are listed in Holmes and Rahe (1967); the weights of Life Events Inventory items are listed in Tennant and Andrews (1976).

the analysis of data both with weighted and with unweighted score values and led to six new variables. Their relationships to sleep disorder measures was also estimated by means of Pearson r_s ; the coefficients are listed in Table 6 (see last six columns of coefficients on the right side of the table). Again, the relationships were weak and mostly nonsignificant, especially those between positive events and sleep disorders. Only the use of the weighted difference index resulted in a more marked increase in number of significant coefficients in the expected direction: The more extreme (in the undesirable direction) the balance between positive and negative events, the more frequent were the sleep disruptions.

Further analysis was to examine whether the relationships of scores on Social Readjustment Rating Scale to insomnia measures were not confounded by other personality variables. In the present sample, age seemed to be such a potentially confounding variable, with a depressing effect on r_s computed between insomnia and Readjustment Scale scores, for the following reason: As shown in Table 7, younger persons experienced both more life change and more negative events listed in the Scale. High scorers in the present sample tended to be younger than low scorers. Insomnia has been observed to be more common in advanced age groups (Mendelson, Gillin, & Wyatt, 1977); however, in the present sample, older persons were more likely to experience less life change or stressful life change and thus were, perhaps, more sheltered from the consequences

Table 7

Relationship of Scores on the Social Readjustment Scale and the Life Events Inventory to
 Personality Variables (N = 170 for the Readjustment Scale and N = 91 for the Life Events Inventory)

Personality variables	Readjustment Scale				Life Events Inventory					Difference index			
	All events		Negative events		Life change	Dis- tress	Negative events		Positive events				
	W+	U/W++	W+	U/W++	W+	U/W++	W+	U/W++	W+		U/W++		
Age	-.34**	-.35**	-.17*	-.24**	.04	-.05	-.05	-.16	-.09	.01	.13	-.16	-.16
Sex	.00	.02	.10	.03	-.05	-.05	-.06	.02	-.06	-.06	-.02	.05	-.04
Dream													
frequency	-.01	-.04	-.01	-.05	-.02	.03	-.05	-.07	-.08	.04	.00	-.09	-.06

Legend: + Weighted; ++ Unweighted; * $p < .05$ (one-tailed); ** $p < .01$ (one-tailed)

of life stress such as insomnia. The interaction of these two factors working in opposite directions along the age dimension could explain why, in the present sample, the correlations between age and insomnia variables were low (absolute value not exceeding .07) and nonsignificant. It is possible that high scores on the Readjustment Scale in the present sample would be more clearly related to insomnia if the sample were more homogenous in respect to age, e.g., upon exclusion of older persons, i.e., of insomnia-prone but low Readjustment Scale scorers. For this reason, the correlation matrix was recomputed for persons between 20 and 30 years of age ($N = 110$) without, however, finding the expected increase in size of coefficients. The lack of stronger relationships of negative events to insomnia variables did not primarily seem to result from an underlying relationship of age to insomniac disorders.

The effect of degree of control over events on the relationship of events to sleep disorders was examined by using three types of weights developed for each event in the Life Events Inventory by Tennant and Andrews (1977). The first indicates the degree of control a person usually has over the incidence of the event, the second the degree to which the incidence of the event is usually attributed to chance alone, and the third the degree to which the event is under the control of other people. The relationships of the three control measures to scores for sleep disorders were not significant ($p > .05$, one-tailed) except the relationship of the nightmare

recall frequency to scores for events controlled by chance alone ($\underline{r} = .20$), and scores for events controlled by others ($\underline{r} = .18$).

Some unanticipated trends in gender differences emerged, all of which involved only the Life Events Inventory but not the Readjustment Scale measures. Above all, the trends were present in the relationships of the nightmare recall frequency to both the number of negative events ($\underline{r} = .48$ for women and $.00$ for men) and to scores for events controlled by chance alone ($\underline{r} = .39$ for women and $-.04$ for men). Although the size of the differences when tested via Fisher's $\underline{z}$ transformation of $\underline{r}$ s appeared as significant with a criterion of a $\underline{p} \leq .05$ (two-tailed), the difference did not reach $\underline{p} \leq .01$ (two-tailed), which was adopted as a criterion in the present study, because there were a very large number of possible similar differences, none of which were anticipated prior to computational analyses.

No comparable gender-linked trends in differences in correlational patterns were observed for other groups of $\underline{r}$ s. Similarly, when Pearson $\underline{r}$ s were computed to evaluate relationships of personality variables (age, sex, marital status) to both sleep disorders and life event measures, no significant ($\underline{p} > .01$, two-tailed) coefficients were found except the relationship of age to Readjustment Scale scores (see Table 7) mentioned earlier; and a relationship of the nightmare recall frequency to gender, found in Sample A ($\underline{r} = .26$): Women reported more nightmares. This trend was not significant for Sample B ($\underline{r} = .20$). Again, the criterion

of significance was $p \leq .01$ (two-tailed) because there were a large number of coefficients and a lack of specific expectations in respect to the direction of relationships.

The events in the Life Events Inventory are divided by Tennant and Andrews (1976) into eight categories according to their content: health, bereavement, family and social, friends and relatives, education, work, moving house, financial and legal. To examine whether events in any of the categories were more clearly related to sleep disorders than were other categories of events, a correlation matrix was computed between scores for each category and all sleep-disorder variables. The data was computed three times, with each event being assigned one point (i.e., an unweighted score) in the first series, with weighted scores for life change in the second, and with weighted scores for amount of distress in the last series of computations. The number of coefficients was large (168 coefficients were computed) but only eight reached $p \leq .05$ (one-tailed)--see Table 8.

Table 8

Relationships of Subcategories of Stressful

Events to Sleep Disorder Variables (N = 91)

Variables:	Pearson r :
Reported nightmare frequency versus change in	
health (weighted)	.38
Reported nightmare frequency versus change in	
health (unweighted)	.26

Table 8 - continued

Unrefreshing sleep versus distress score for	
health (weighted)	-.24
Reported nightmare frequency versus distress	
score for education (weighted)	.23
Sleep onset problems versus change at work	
(unweighted)	-.22
Sleep maintenance problems versus distress	
score in family area (weighted)	.20
All sleep disorders (a pooled score) versus	
distress score in family area (weighted)	.17
All sleep disorders (a pooled score) versus	
distress in the area of education	
(weighted)	.17
The coefficients in Table 8 are rank ordered according to their absolute magnitude. Their size is small and two are in a direction opposite to that expected. The only relationship which would withstand attempts to eliminate chance findings by adopting a more stringent criterion of significance ($p \leq .01$, two-tailed) was between the nightmare recall frequency and weighted scores (weightings for life change) in the category "health", i.e., a relationship which could be based on an association of nightmares with somatic dysfunctions generally rather than with the stress implied by theories of life change.	

An attempt was made to examine whether any single event listed in the two inventories had, when considered alone, a noticeable impact on the sleep variables. To avoid unreliable findings, only events reported by at least 10 persons were included in the analysis. Pearson r_s were computed for the relationships of all eligible events to the sleep-disorder variables, but the search for any coefficients larger than .30 (an arbitrarily set criterion to avoid or minimize both chance level and weak findings on two samples of different size) led only to two r_s : The nightmare recall frequency was related to reports of being separated from someone important to the person ($r = .34$), and to reports of moderate financial difficulties ($r = .31$).

As described earlier, Zeiss (1980) proposed a new weighting system for the Readjustment Scale: Weights for aversive impact were assigned to the items of the scale on the basis of ratings by 57 undergraduate students. Although the sample was too small and perhaps unrepresentative, the weighted scores were, for explorative purposes, included in the present analysis of the data. The mean Zeiss' aversiveness score for the Readjustment Scale sample (170 students), see Sample A, was 22.3 ($SD = 14.6$). The relationships of the aversiveness scores to sleep disorder variables were evaluated by means of Pearson correlation coefficients--see Table 9. Most of the relationships were nonsignificant ($p > .05$; one-tailed).

Table 9
Relationships of Zeiss' Aversiveness Scores
to Sleep Disorder Variables (N = 170)

Sleep variables:	Pearson r_s :
All sleep disorders	.16*
Nightmare frequency	.24**
Insomniac disorders	.11
Falling asleep	.03
Waking up	.13
Unrefreshing sleep	.11
Not quiet sleep	.08

Legend: * $p \leq .05$ (one-tailed); ** $p \leq .01$ (one-tailed)

The only two significant relationships were in the expected direction but low. A comparison of Table 9 with Table 6 shows that the relationships of stress variables of the Readjustment Scale to sleep disorder variables were more clear-cut when a short list of 15 negative events (a subdivision of the Scale) was used as a measure of aversiveness. Regardless of whether this short list was used with weighted or unweighted scores, its relationships to all sleep disorder variables were significant.

Zeiss' aversiveness scores were, however, very closely related to other stress measures of the Readjustment Scale--see Table 10.

Table 10
Relationship of Zeiss' Aversiveness Scores to Other
Stress Scores of the Readjustment Scale (N = 170)

Stress scores:	Pearson <u>rs</u>
Weighted:	
All events (life change)	.98
Negative events only	.63
Unweighted:	
All events (life change)	.99
Negative events only	.72

Legend: All coefficients are significant at $p < .001$
(one-tailed)

The coefficients suggest that Zeiss' aversiveness scores are almost practically identical with the original scores for life change. Both scoring systems can be seen as different from the scores based on the list of 15 negative events only. In fact, an inspection of Tables 9 and 6 shows that coefficients for the relationship of sleep disorder variables to the original life change scores of the Readjustment Scale are similar to coefficients for their relationship to the Zeiss' scores.

Zeiss' aversiveness scores were unrelated to personality variables listed in Table 11, with the exception of age: Zeiss' scores were higher in younger persons. Younger persons reported greater amounts of aversive life change.

Table 11
Relationship of Zeiss' Aversiveness Scores
to Personality Variables (N = 170)

Personality variables:	Pearson <u>rs</u> :
Age	-.35*
Sex	.03
MMPI Lie Scale	.03
Dream recall frequency	-.04

Legend: * $p < .01$ (two-tailed)

Measures such as nightmare recall frequency (NRF) are likely to be considerably distorted by inaccurate recall, especially when they are based on long-term retrospective estimates, e.g., estimates for a period of the last six months, as in the present study. It is possible that the distortions would be less serious if, instead of an estimate of NRF, the participants would be selected for an extreme group of those saying they woke up, at least once in the last six months, as a consequence of a nightmare (see item 6 in Appendix 1), and another extreme group of those who reported no nightmare for the last six months. The former are more likely to have experienced intensive nightmares; the latter are less likely to have experienced any nightmares in the time span. The intermediate group of those who reported at least one nightmare but no related awakenings could be excluded in the analysis of the data.

In the present study, the magnitude of the relationships of the dichotomous variable based on the membership in the two extreme groups to various stress scores was evaluated by means of the point-biserial coefficients--see Table 12.

Table 12

Relationship of Stress Variables to a Dichotomy of
Either Not Reporting Any Nightmare or of Reporting
Waking Up as a Consequence of a Nightmare (N = 162
for the Readjustment Scale Data and N = 50 for the
Life Inventory Data)

Stress variables:	Point biserial coefficients:
Social Readjustment Scale:	
Number of events	.20**
Number of negative events	.26**
Weighted score for change	.18**
Zeiss' aversiveness score	.20**
Life Events Inventory	
Number of events	-.06
Number of negative events	.05
Number of positive events	-.19
Weighted score for change	-.09
Weighted score for distress	.03

Legend: ** $p \leq .01$ (one-tailed); none of the other coefficients was significant ($p \leq .05$; one-tailed).

As shown in Table 12, the use of the dichotomous measure of nightmare reporting did not lead to larger coefficients than those found with the original measure of reported nightmare frequency (the latter set of coefficients is listed in Table 6; see also Table 9 for the relationship of reported nightmare frequency to Zeiss' aversiveness scores).

Of special interest is also the relationship of dream recall to insomniac complaints. Lugaresi, Cirignotta, Zucconi, Mondini, Lenzi, and Coccagna (1983) found that self-defined poor sleepers reported dreaming significantly more than good sleepers: About 53% of the former but only 22.6% of the latter reported dreaming "a lot". Most of the good sleepers (77%) reported only occasional dreaming. It has often been suggested that insomniac difficulties are associated with a habit of ruminative worrying or self-scrutiny when in bed trying to fall asleep (see e.g., Coursey et al., 1975). It is possible that intensive self-observation might enhance dream recall.

The Pearson r_s for the relationships of dream recall frequency to insomnia variables for the two samples in the present study are listed in Table 13. Only one of the eight coefficients ($r = .24$) was significant ($p < .05$, one-tailed): The trend is unreliable.

Table 13
 Relationships of Insomnia Variables to Estimates of
 Dream Recall Frequency--Pearson r_s (N = 170 for
 Sample A and N = 86 for Sample B)

	Sample A	Sample B
Falling asleep	-.01	.06
Waking up	-.03	.11
Unrefreshing sleep	-.01	.18
Not quiet sleep	-.06	.24*

Legend: * $p < .05$; one-tailed

An additional analysis dealt with the relationship of insomnia variables to estimates of nightmare frequency. The analysis departed from the following considerations. As mentioned earlier, Hartmann (1984) found in comparisons of MMPI profiles of nightmare sufferers with profiles of insomniacs that insomniacs scored higher on the neurotic triad (especially on Depression and Hysteria scales) and nightmare sufferers higher on the psychotic scales (especially on the Schizophrenia scale). Similar trends may also be discerned in comparisons of sleep onset with sleep maintenance insomniacs (see Beutler et al., 1978): The profiles of the latter are more similar to profiles of REM nightmare sufferers than are the profiles of the former. Furthermore, REM nightmares (i.e., the most frequent type of

nightmares) usually occur from longer REM periods, i.e., towards the end of the night (e.g., between 4:00 and 7:00 a.m.). This also suggests that reports of frequent nightmares might be more often associated with reports of sleep maintenance insomnia than with reports of sleep onset insomnia. However, in the present study, the Pearson r_s for the relationship of estimated nightmare frequency to sleep maintenance insomnia ($r = .11$ for Sample A and $r = .12$ for Sample B) and to sleep onset insomnia ($r = .09$ for Sample A and $r = .11$ for Sample B) were all very low and nonsignificant ($p > .05$; one-tailed): The expected trend was not found.

1.3 Conclusions from Study I. Similarly to results of the recent insomnia study by Healey et al. (1981), a small subgroup of negative events of the Readjustment Scale emerged as the variable with the most clearly marked relationships to reports of sleep disorders. Even the largest coefficients, however, suggested that the relationships are weak and do not present any evidence for a causal relationship. A different study design, e.g., cross-lagged correlational studies (Kenny, 1975), would be more helpful in this latter respect. In fact, the weak association between reports of events and of sleep disorders could easily be accounted for by memory or attitudinal factors such as a readiness to recall and report negative personal experiences; both negative events and experiences of sleep disorders are negative personal experiences and the correlation between the two types of negative experiences could be spurious.

If positive or neutral experiences were also involved, the r_s computed between variables such as the dream recall frequency and scores for life events would be higher than in the present study (all 13 r_s were low and nonsignificant; see Table 7). Research is needed on the influence of personality factors on key correlational findings in similar studies based exclusively on self-report data: The correlations could be spurious. Another problem arises from the large number of Pearson r_s computed in the present study: More than 1,000 coefficients were computed. Many of them may be significant by chance: The results should not be overinterpreted. Replications are needed.

To examine an opposite viewpoint, the failure to find stronger support for the clinical lore that aversive events do disrupt sleep could be due to several reasons. First, many highly personal negative life experiences are listed neither in the Readjustment Scale nor in the Life Events Inventory, e.g., subtle emotional problems in close relationships. Second, the inaccuracy of measures inherent in similar retrospective reports based not only on memory but also on other factors such as perceived social desirability could somewhat distort the results. Third, intervening social support (Dean & Lin, 1977) or personality variables which modify the effects of exposure to life stress might minimize the size of coefficients computed to estimate the relationship of stress to symptoms (see a review by Johnson & Sarason, 1979). Fourth, the effects of events on sleep disorders may have been delayed. A similar

delayed effect was clinically observed in war veterans (Horowitz & Solomon, 1975).

A further complication lies in the possibility that different types of stressful life events result in specifically different pathological symptoms; there is need to counteract an unthinking belief in widely used global measures of life change or distress. Listing which events or clusters of single events, from those included in global inventory measures, were significantly related to a specific symptom or syndrome could, at the least, provide some negative findings. For example, in the present study, many markedly negative events had occurred too infrequently for statistical analysis and the relationships of the remaining single events to sleep disorders were weak and often nonsignificant. It seems that in spite of many studies, the hypothesized (and clinically assumed) relationship of events to symptoms still remains a largely unmapped territory in need of extensive research.

It should be emphasized that chronobiological considerations need to be included in the design of future studies on the relationship of stressful events to sleep disorders. In many persons in the present study, the insomniac complaints could be only of a transient nature and result from the disruption of the habitual sleep/wake cycle due to changes in shift work schedule (or military alerts) and/or to various intercontinental travel duties over several time zones--rather than from impact of stressful events. Similar explorations would, however, call

for more detailed data about individual sleep conditions than the data gathered in the present study.

2. Study II

The second study examined whether nightmare reports are thematically linked to content of reported stressful events. The hypothesis to be tested stated that persons reporting specific types of stressful events were likely to also report nightmares with similar content.

2.1 Method.

2.1.1 Subjects. All participants were part-time undergraduate students enrolled in psychology courses. They were a subgroup of subjects of Study I: Only persons who could recall the content of their nightmares in the last six months were selected for the present analysis. Mean age and gender frequency data are listed in Table 2 (see Sample C and Sample D). The men and women in the two samples did not significantly differ in respect to age (point biserial coefficients, $p > .05$; two-tailed).

2.1.2 Procedure. The students were instructed that in this study the word "nightmare" was defined as "any frightening dream". The definition is somewhat more encompassing than in a study by Cellucci and Lawrence (1978). Their definition narrowed the concept to anxiety-provoking dreams "from which a person usually awakens". Although the awakenings from the dream were not listed as a distinctive feature of nightmares as defined in the present study, information about waking up as a consequence

of nightmares was collected (see item 6 in Appendix 1) for subjects from all samples listed in Table 2.

The participants were asked to underline on the following check list the themes around which their nightmare centred in the last six months:

1. Fights or being assaulted or killed,
2. Family members or close friends
3. Accidents or falling down or drowning,
4. Other themes.

The categories were partly developed on the basis of a previous study of nightmare content in Swiss university students (Cernovsky, 1983) and on the basis of preliminary interviews with U.S. students. A very large proportion of nightmares dealt with violence: The violent scenes were either a consequence of accidents or of human intent. This distinction led to categories 1 and 3. Category 2 was created to accommodate nightmares involving family members and close friends in a variety of contexts. Sometimes the situations appeared innocuous, but were paradoxically accompanied by intense anxiety. On a direct or symbolic level, the material might deal with embarrassment in front of most significant others, or with a loss of a close emotional tie, with interpersonal conflicts in close relationships, or with outside threats or pressures on the relationship. Category 4 was added to provide for material not fitting into the other categories; the students were to describe the content of nightmares in this last category in a blank space within the questionnaire form.

Members of Sample C were administered the Social Readjustment Rating Scale (Holmes & Rahe, 1967) and members of Sample D the Life Events Inventory (Tennant & Andrews, 1976). They were to check all events which had occurred within the last six months.

2.2 Results. The incidence of content falling in the four nightmare content categories reported by the members of Sample C and Sample D is indicated in Table 14.

Table 14

Proportions of Persons in Sample C (N = 98) and in Sample D (N = 56) Reporting the Incidence of Nightmare Content Along Four Categories for the Last Six Months

Content categories:	Sample C:	Sample D:
1. Fights, being assaulted or killed	32.7%	26.8%
2. Family members or close friends	49.0%	42.9%
3. Accidents or falling down or drowning	27.6%	37.5%
4. Other themes	34.7%	35.7%

Men and women in the two samples did not significantly differ in reported incidence of each of the four types of nightmare content (χ^2 -tests, $df = 1$, $p > .05$, two-tailed). Contents in more than one category were reported by 38.8% of persons in Sample C and 28.6% in Sample D.

As explained earlier, the participants in Study II are a subsample of participants in Study I (see Table 2): Only

persons remembering the content of their nightmares were included in Study II. The proportions of women among the recallers of nightmare content is somewhat higher than the proportion of men; see Table 2. The difference was tested in χ^2 -tests and was significant in a comparison of Sample A and Sample C ($\chi^2 = 6.2$, $df = 1$, $p = .02$, two-tailed) but not in a comparison of Sample B and Sample D ($\chi^2 = 1.73$, $df = 1$, $p = .19$, two-tailed). The trend is likely to be unreliable.

Mean scores of Sample C on the Readjustment Scale and of Sample D on the Life Events Inventory are indicated in Table 15.

Table 15

Mean Scores of Sample C (N = 98) and of
Sample D (N = 56) on Measures of Stress

Stress variables:	$\bar{X}$	SD
Social Readjustment Scale		
Number of events	9.1	5.5
Weighted score for life change . . .	210.3	121.1
Life Events Inventory		
Number of events	8.1	3.9
Weighted score for life change . . .	134.4	73.4
Weighted score for distress	74.9	50.6

The relationships of reported nightmare content themes to reports of waking life events were evaluated via χ^2 -tests. The criterion of significance was set at $p \leq .01$ (one-tailed) because the number of tests to be carried out was large (N = 135). The

last category of nightmare content ("other themes", see procedure section) was not included in the computations due to its vague nature. When the presence of an event was reported by fewer than 10 persons, the data based on this event were not considered in the statistical analyses. The same restriction was set on events reported too frequently (fewer than 10 persons reporting the absence of the event). None of the remaining 27 events of the Readjustment Scale and 18 events of the Life Events Inventory were significantly related to recall of the three nightmare content themes.

Some persons reported more than only one of the four nightmare themes. The number of themes (i.e., a variable with scores ranging from 0 to 4 points) was significantly related (Pearson r_s , $p = .01$, one-tailed) to none of the 27 events of the Readjustment Scale and to only three of the 18 events of the Life Inventory: death of close friend or relative (item 15, $r = .35$); troubles with boss, supervisor, or co-workers (item 51, $r = .34$); and, major change in working hours (item 52, $r = .42$).

Neither the number of nightmare themes nor the incidence of each theme separately were significantly related (Pearson r_s , $p \leq .01$, one-tailed) to various types of standard and experimental scores for amount of life stress, number of positive and negative events, etc. (see description in Study I), and age. The exceptions were relations of the number of reported nightmare themes to number of events checked on the

Life Inventory ($r = .40$), and the number of negative events on this inventory ($r = .32$): Persons who experienced more events reported more nightmare themes.

Tennant and Andrews (1976) grouped the events of the Life Inventory into eight categories according to content areas: health, family and social, work, etc. Number of events in each category, weighted total score for amount of life change on each category, or a similar weighted score for amount of distress were not significantly related (Pearson r_s , $p \leq .01$, one-tailed) to any of the three nightmare themes or to the number of recalled themes, with the exception of a significant relationship between number of events at work and number of reported nightmare themes ($r = .35$). An attempt was made similarly to group the events of the Readjustment Scale. Three categories were formed: health; family and friends; work, education and financial changes. None was significantly related (Pearson r_s , $p \leq .01$, one-tailed) to the nightmare content variables.

2.3 Conclusions from Study II. In contrast with clinical lore, no direct associations of specific stressful life events to specific nightmare themes were found. However, this study excessively relied on correlational retrospective design, on self-report data which may be distorted by inaccurate recall or other factors, and on naturally occurring events of relatively mild or moderate stress value reported by persons with normal coping skills. Replicatory research with more rigorous controls

and more reliable and valid measures is needed. For example, measures based on a daily or weekly record of nightmare themes and of incidence of waking life events might be more reliable.

It is also possible that the present findings were negative because the content of minor stressful events is incorporated in nightmare themes in a predominantly symbolic manner rather than directly. In line with this assumption, the number of reported themes was significantly associated with the number of reported events. The relationship, however, could be spurious: Some persons might consistently be more willing or able to recall more nightmare themes and a larger number of negative waking life events regardless of their true underlying incidents (see Study I). Investigations in this area are a necessary further step to clarify the dynamics of the relationship between the content of waking life events and nightmares.

The value of the present study lies in its similarity to psychotherapy settings. Psychotherapists also deal with biased sets of retrospective estimates offered by their patients. Many therapists assume that reports of stressful life events and nightmare content are closely related. The present study shows that the relationship is nonsignificant in adults with normal coping skills who presumably experienced only moderately stressful events.

IV DISCUSSION

The main concern of this investigation was with the relationships of reported stressful events to reported frequencies of sleep disorders. The expectations expressed in hypothesis No. 1 were not supported by the results. Although expected relationships were found, they were inconsistent, i.e., not replicable with a different list of stressful events, and the coefficients computed to estimate the magnitude of the significant relationships were low.

As stated earlier (see concluding paragraphs of Study I), the observed significant relationships could be spurious: Underlying factors such as willingness or tendency to frequently recall and report personal negative experiences, i.e., both sleep disorders and stressful events from the waking life, regardless of their real incidence, could account for the observed significant Pearson rs.

Similarly, the second hypothesis was also not supported by the data: Reports of specific nightmare content were unrelated to reports of specific types of stressful events. The value of the statistical data presented in Study I and Study II, i.e., in studies evaluating the evidence for the first and second hypothesis, lies in demonstrating that clinical lore about sleep disorders might be at least partly incorrect when applied to normal adults: Reports of stressful events were not closely associated with reports of sleep disorders and reports of

specific nightmare themes did not have their counterpart in reports of similar events from waking life. The present study, however, was not carried out on persons living under extreme stress or on psychiatric patients undergoing psychotherapeutic treatment. Further research investigations are needed to assess whether clinical lore would be supported by tests of the two hypotheses on similar subsamples of the general population. The persons and/or the situational factors would then be more comparable to settings in which the clinical speculations about sleep disorders developed.

Special attention should be paid to the fact that only a very few participants in the present investigation experienced very stressful events such as death of a family member or close friend, in the six-month interval. The events which accounted for the major portion of "stress scores" on the measures of life stress were not overwhelming or extremely aversive. Similar methodological problems, i.e., lack of truly stressful presleep events, have been faced in the majority of empirical studies of effects of presleep experiences on sleep parameters (see Beaumaster et al., 1978; Goodenough et al., 1975). Studies of persons under more intensive stress, such as anticipated surgery, were limited to a small number of subjects (Breger et al., 1971; Wadson, 1966). However, it should be remembered that the present study was not aimed at evaluating the impact of real stressful events on sleep disorders. As already stated, its

design was geared towards testing whether potentially biased reports of stressful events occurring within the somewhat distant past (time span of the last six months) were associated, in normal persons, with similar reports of sleep disorders (see introductory section of this manuscript). The lack of reported incidence of more stressful events, in spite of the relatively large size of the samples of subjects, was not anticipated because data in this area are still lacking.

V Summary/Abstract

Two hypotheses about the relationships of reports of sleep disorders to reports of stressful life events were tested. The first stated that persons reporting more stressful events were likely to report higher frequency of sleep disorders. The hypothesis was tested in the following manner. Scales to assess nightmare recall frequency and recalled frequency of insomnia-related disorders (sleep onset, sleep-maintenance problems, unrefreshing sleep, restless sleep) were administered, together with the Social Readjustment Rating Scale of Holmes and Rahe, to 170 part-time undergraduate students (mean age 27.4 years, 97 men, 73 women), and, together with the Life Events Inventory of Tennant and Andrews, to another sample of 91 part-time undergraduates (mean age 26 years, 53 men, 37 women). The time span for which life events and sleep disorders were to be assessed was the previous six months. Pearson rs suggested that the relationships of different types of scores for life events (scores for change, for distress, for amount of control over events, weighted and unweighted scores for negative and positive events) to reports of sleep disorders were mostly weak (the largest coefficient was .29) and nonsignificant. Of all life events measures, negative life events listed on the Readjustment Scale were the most closely associated with reports of sleep disorders; all 14 coefficients involving negative events were significant and in the clinically expected direction.

Further research is needed to examine whether the size of correlations between events and sleep disorders is related to factors such as readiness to recall and report negative personal experiences.

The second hypothesis stated that persons reporting specific types of nightmare content were also likely to report nightmares with similar content. All subjects from the two samples described earlier were screened for recall of specific nightmare contents. Only students who reported remembering content of their nightmares in the last six months ($N = 154$) were selected for this stage of data analysis. Scores on the Social Readjustment Scale were available for 98 students and scores on the Life Inventory for the remaining 56 students. The relationships of incidence of three types of nightmare themes to incidence of specific events in the Readjustment Scale and the Life Inventory were evaluated in χ^2 -tests. No significant relationships were found in respect to the hypothesis. Persons who experienced more events on the Life Inventory also reported more nightmare themes; however, similar relationship was not observed for events listed in the Readjustment Scale.

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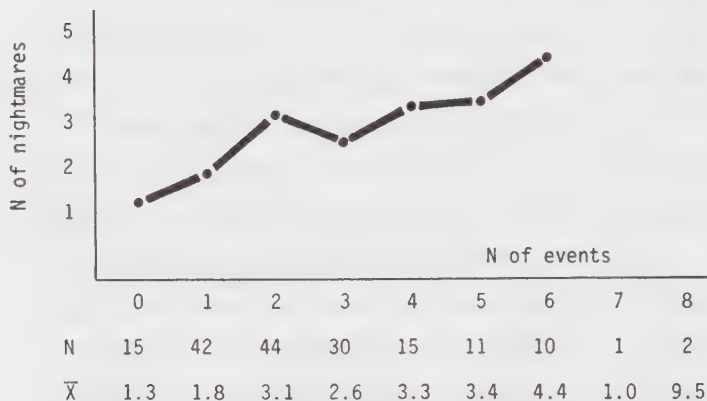
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VII GRAPHIC DATA: FIGURES 1 TO 18

Although the following diagrams are based on data from Sample A ($N = 170$) and Sample B ($N = 91$) from Study I, some items of information were not available for one or several persons from the two samples. The N of persons listed on the categories in the diagrams, therefore, does not always reach 170 for Sample A and 91 for Sample B. In computational analyses, the missing data coding (see Nie, Hull, Jenkins, Steinbrenner, & Bent, 1975) was used to cope with this problem.

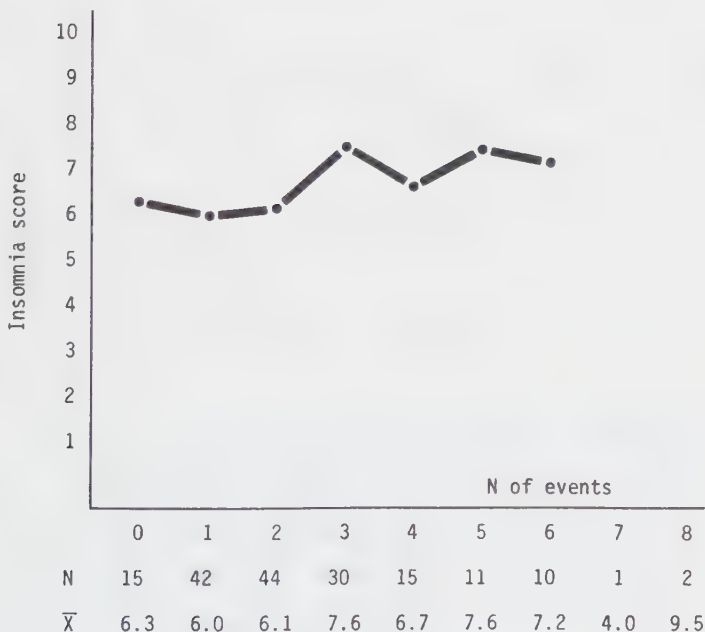
The distributions of variables included in the relationships represented in the diagrams were often skewed. Some of the categories on the horizontal axis, especially towards the right margin, were based on $N < 8$. No diagram curve was drawn for such categories because the low N does not provide a sufficient basis for generalizations. However, the mean values for the corresponding variable are provided in the lowest horizontal row, below the diagram.

Figure 1: Relationship of reports of nightmare frequency to reports of incidence of events on the Readjustment Scale (Sample A).



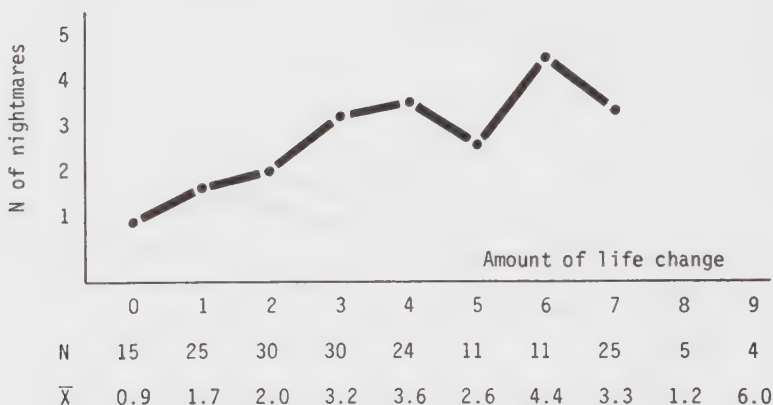
Legend: The N of events reported on the Readjustment Scale is indicated on the horizontal axis. The vertical indicates the mean values of reported nightmare frequency. The mean frequency values are listed in the lowest horizontal row. The row above indicates the N of persons on which the mean values are based.

Figure 2: Relationship of reports of insomnia to reports of incidence of events on the Readjustment Scale (Sample A).



Legend: The N of events reported on the Readjustment Scale is indicated along the horizontal axis. The vertical indicates mean insomnia scores. The mean insomnia values are listed in the lowest horizontal row. The row above indicates the N of persons on which the values are based. The insomniac score was calculated by adding scores for the 4 types of insomniac complaints (see Procedure section).

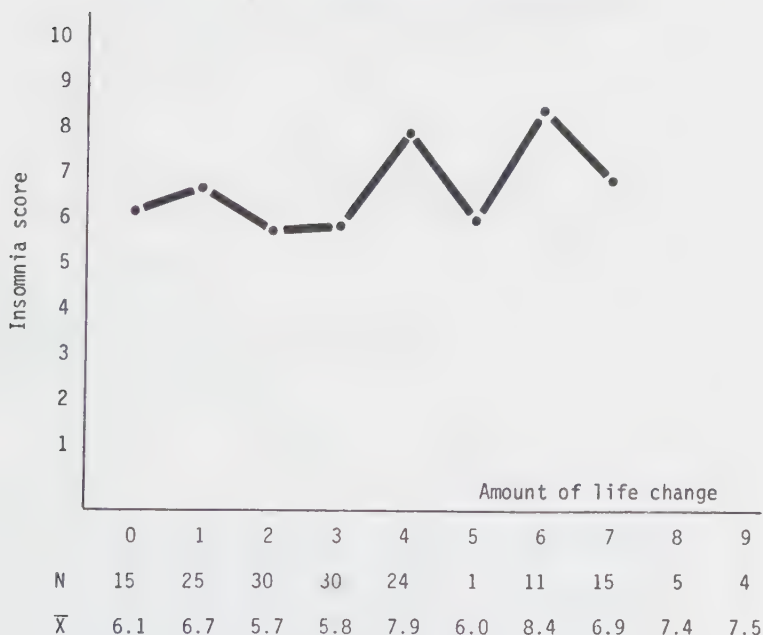
Figure 3: Relationship of reports of nightmare incidence to scores weighted for amount of life change (Sample A).



Legend: Categories indicating various levels of scores weighted for amount of life change are listed on the horizontal axis. The corresponding values of the nine categories in Life Change Units (see Holmes & Rahe, 1967) are as follows: 0 = 0 to 50, 1 = 51 to 100, 2 = 101 to 150, 3 = 151 to 200, 4 = 201 to 250, 5 = 251 to 300, 6 = 301 to 350, 7 = 351 to 400, 8 = 401 to 450, 9 = above 451.

The vertical axis indicates mean values for the reported nightmare frequency. The mean values are listed in the lowest horizontal row. The row above indicates the N on which the mean values are based.

Figure 4: Relationship of insomnia scores to scores weighted for amount of life change (Sample A).

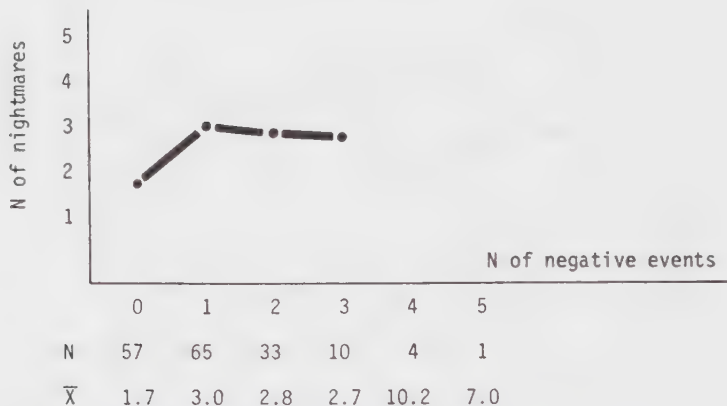


Legend: Categories indicating various levels of scores weighted for amount of life change are listed along the horizontal axis. The values of the nine categories in Life Change Units are indicated in the legend for Figure 3.

The vertical axis indicates corresponding insomnia scores (sum of scores on the 4 types of insomniac complaints).

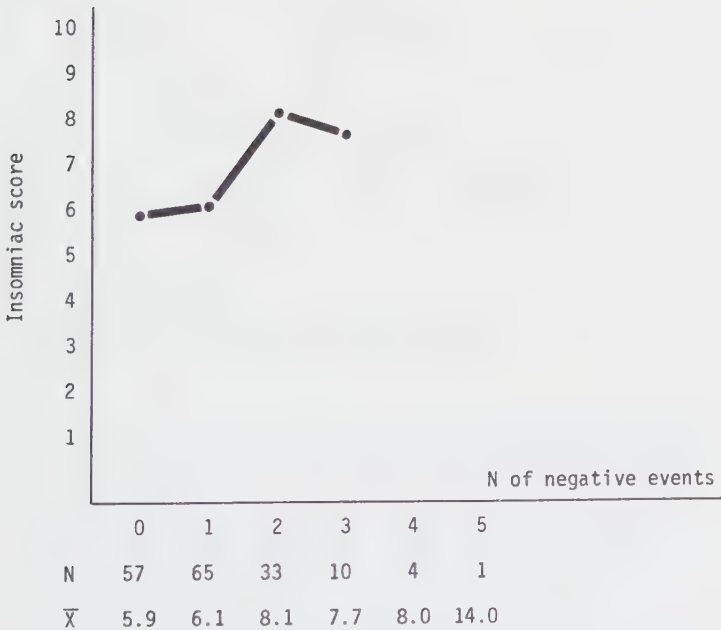
The mean insomnia values are listed in the lowest horizontal row. The row above indicates the N of persons on which the mean values are based.

Figure 5: Relationship of reported incidence of nightmares to the N of negative events reported on the Readjustment Scale (Sample A).



Legend: The N of negative events is indicated on the horizontal axis. The vertical indicates mean N of nightmares. The mean values are listed in the lowest horizontal row. The row above indicates the N of persons on which the mean values are based.

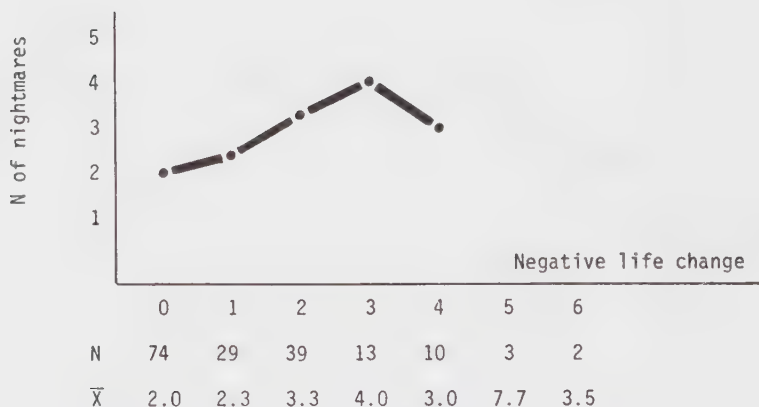
Figure 6: Relationship of insomnia scores to the N of negative events reported on the Readjustment Scale (Sample A).



Legend: The N of negative events is listed on the horizontal axis. The vertical indicates mean insomnia scores. The mean values are listed in the lowest horizontal row. The row above indicates the N of persons on which the mean values are based.

The insomniac score was calculated by adding scores for the 4 types of insomniac complaints (see Procedure section).

Figure 7: Relationship of reported nightmare frequency to scores weighted for amount of life change based on negative events only from the Readjustment Scale (Sample A).



Legend: The various levels of scores weighted for amount of life change are indicated along the horizontal axis. The six categories correspond to the following ranges of Life Change Units (see Holmes & Rahe, 1967): 0 = 0 to 25, 1 = 26 to 50, 2 = 51 to 75, 3 = 76 to 100, 4 = 101 to 125, 5 = 126 to 150, 6 = 151 or above.

The vertical axis indicates mean N of reported nightmares. The mean values are listed in the lowest horizontal row. The row above indicates the N on which the mean values are based.

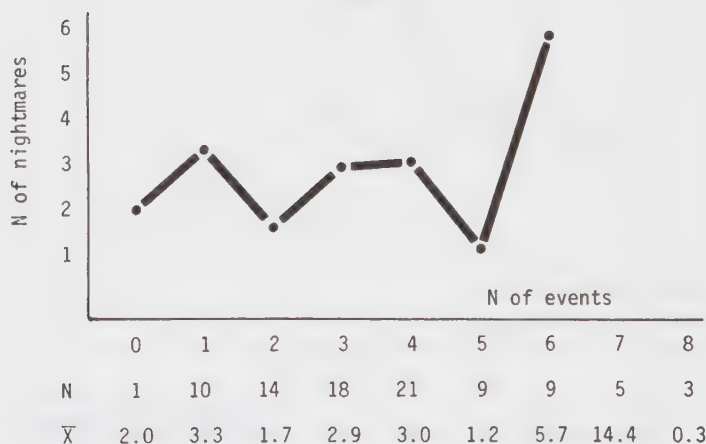
Figure 8: Relationship of insomnia scores to scores weighted for amount of life change and based on negative events only (Social Readjustment Scale data, Sample A).



Legend: The various levels of scores weighted for amount of life change are indicated along the horizontal axis. The six categories correspond to the following ranges of Life Change Units (see Holmes & Rahe, 1967): 0 = 0 to 25, 1 = 26 to 50, 2 = 51 to 75, 3 = 76 to 100, 4 = 101 to 125, 5 = 126 to 150, 6 = 151 or above.

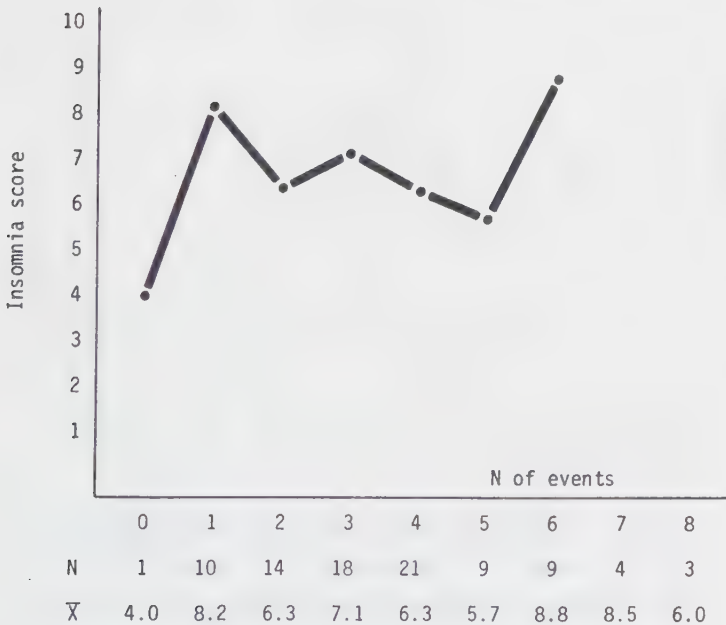
The vertical axis indicates insomnia scores. The mean values are listed in the lowest horizontal row. The row above indicates the N of persons on which the mean values are based. The insomnia score is a sum of scores for the 4 types

Figure 9: Relationship of reported nightmare frequency to the N of events reported on the Life Events Inventory (Sample B).



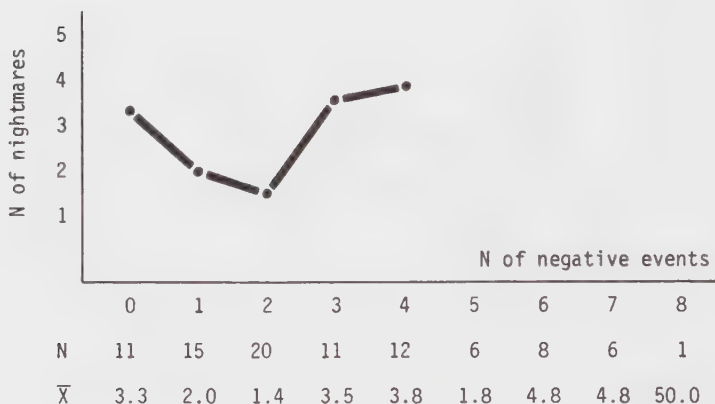
Legend: The N of events is indicated along the horizontal axis. The dimension represented by the vertical axis indicates mean N of nightmares. The mean values are listed in the lowest horizontal row. The row above indicates the N of persons on which the mean values are based.

Figure 10: Relationship of insomnia scores to the N of events reported on the Life Events Inventory (Sample B).



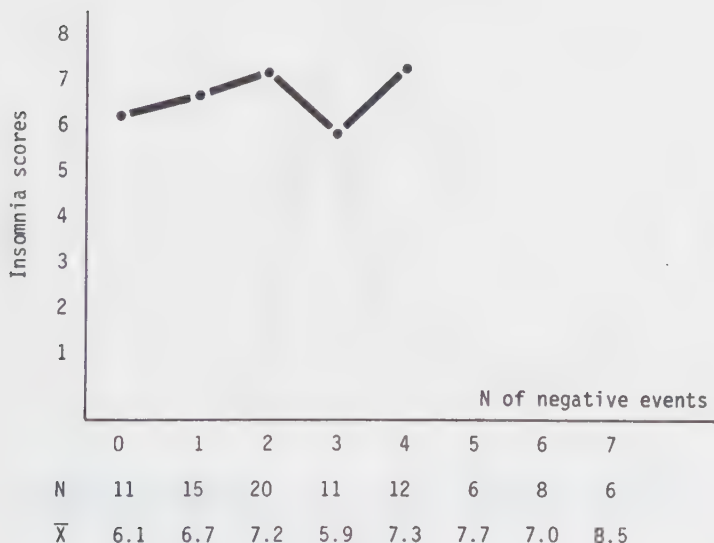
Legend: The N of events is indicated along the horizontal axis. The vertical indicates insomniac scores (sum of scores for the 4 types of insomniac complaints; see Procedure section). The mean values are listed in the lowest horizontal row. The row above indicates the N of persons on which the mean values are based.

Figure 11: Relationship of reported nightmare frequency to the N of negative events reported on the Life Events Inventory (Sample B).



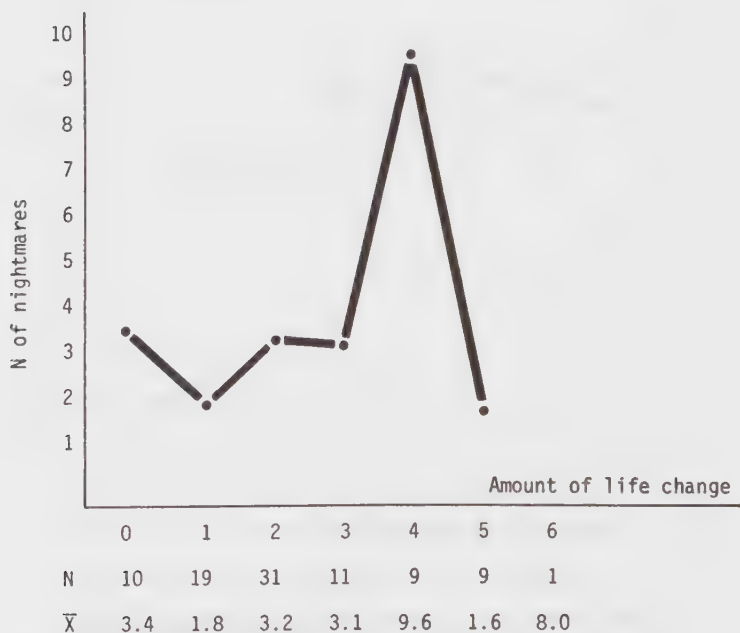
Legend: The N of events is indicated on the horizontal axis. The vertical indicates mean N of nightmares. The mean values are listed in the lowest horizontal row. The row above indicates the N of persons on which the mean values are based.

Figure 12: Relationship of insomniac scores to the N of negative events reported on the Life Events Inventory (Sample B).



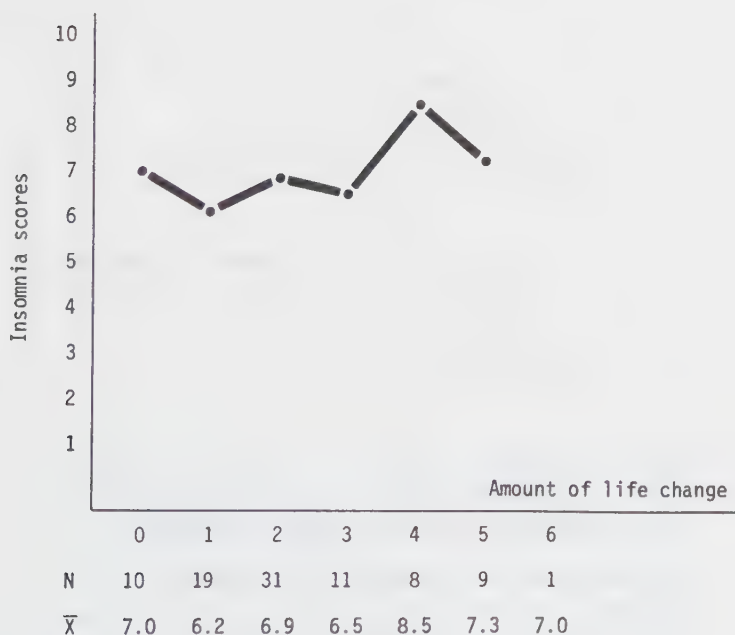
Legend: The N of events is indicated on the horizontal axis. The vertical indicates insomnia scores (sum of scores for 4 types of insomniac complaints; see Procedure section). The mean insomnia scores are listed in the lowest horizontal row. The row above indicates the N of persons on which the mean values are based.

Figure 13: Relationship of reported nightmare frequency to weightings for amount of life change on the Life Events Inventory (Sample B).



Legend: The various levels of life change are indicated along the horizontal axis. The 6 categories on this axis correspond to the following weighting ranges: 0 = 0 to 50, 1 = 51 to 100, 2 = 101 to 150, 3 = 151 to 200, 4 = 201 to 250, 5 = 251 to 300, 6 = 301 to 350. (See Tennant & Andrews, 1976, 1977 for weightings of individual events.) The vertical axis indicates the N of nightmares. The mean nightmare frequency values are listed in the lowest horizontal row. The row above indicates the N of persons on which the mean values are based.

Figure 14: Relationship of insomnia scores to weightings for amount of life change on the Life Events Inventory (Sample B).



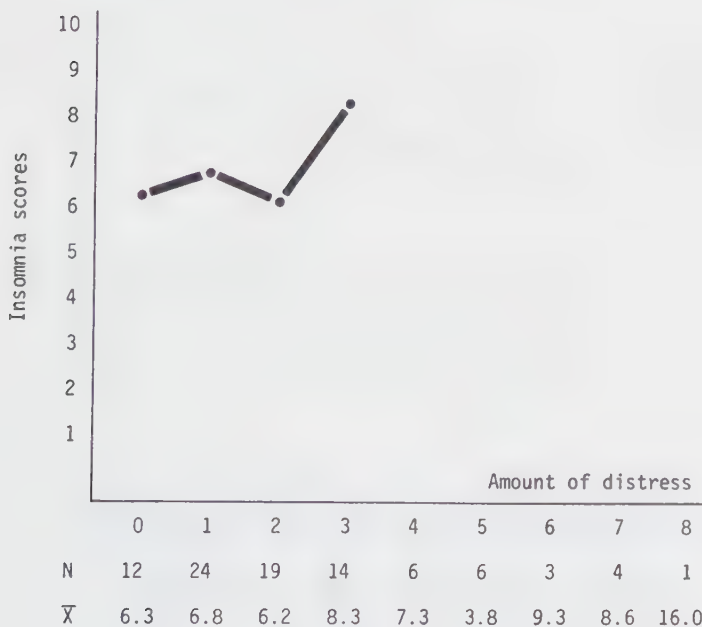
Legend: The various levels of life changes are indicated along the horizontal axis. The weighting ranges represented by the 6 categories are listed in the legend for Figure 13. The vertical axis indicates insomnia scores (sum of 4 types of insomniac complaints; see Procedure section). The mean values are listed in the lowest horizontal row. The row above indicates the N of persons on which the mean values are based.

Figure 15: Relationship of reported nightmare frequency to weightings for amount of distress on the Life Events Inventory (Sample B).



Legend: The various levels of distress are indicated on the horizontal axis. The 8 categories correspond to the following ranges of weightings: 0 = 0 to 25, 1 = 26 to 50, 2 = 51 to 75, 3 = 76 to 100, 4 = 101 to 125, 5 = 126 to 150, 6 = 151 to 175, 7 = 176 to 200, 8 = 201 and above. (See Tennant & Andrews, 1976, 1977 for weightings of the individual events.) The vertical axis indicates the N of nightmares. The mean nightmare frequency values are listed in the lowest horizontal row. The row above indicates the N of persons on which the mean values are based.

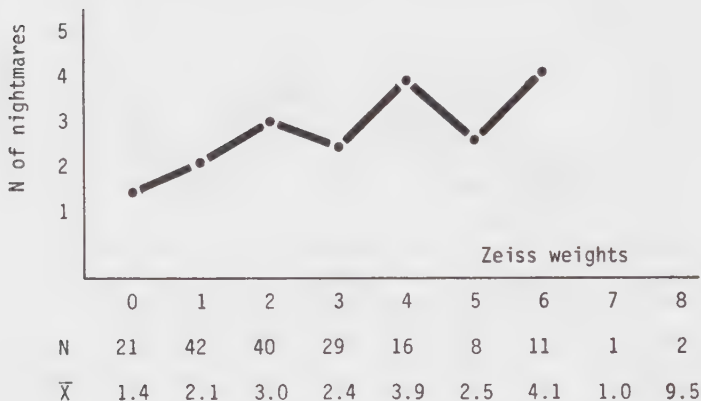
Figure 16: Relationship of insomnia scores to weightings for amount of distress on the Life Events Inventory (Sample B).



Legend: The various levels of distress are indicated on the horizontal axis. The weighting ranges represented by the 8 categories are listed in the legend to Figure 15.

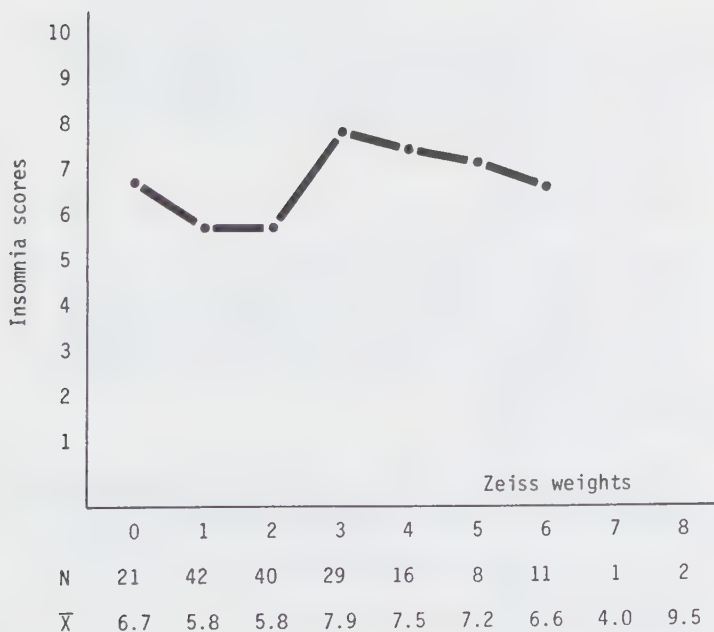
The vertical axis indicates insomnia scores (sum of scores for 4 subtypes of insomniac complaints; see Procedure section). The mean values of insomnia for each distress level are listed in the lowest horizontal row. The row above indicates the N of persons on which the mean values are based.

Figure 17: Relationship of reported nightmare frequency to Zeiss weightings for amount of aversive life change (Readjustment Scale data, Sample A).



Legend: The various levels of aversive life change are indicated along the horizontal axis. The 8 categories correspond to the following ranges of weightings: 0 = 0 to 8, 1 = 8.01 to 16, 2 = 16.01 to 24, 3 = 24.01 to 32, 4 = 32.01 to 40, 5 = 40.01 to 48, 6 = 48.01 to 56, 7 = 56.01 to 64, 8 = 64.01 and above. (See Zeiss, 1980 for weightings of individual events.) The vertical axis indicates the N of nightmares. The mean values for nightmare frequency are listed in the lowest horizontal row. The row above indicates the N of persons on which the mean values are based.

Figure 18: Relationship of insomnia scores to Zeiss weightings for amount of aversive life change on the Readjustment Scale (Sample A).



Legend: The various levels of aversive life change are indicated along the horizontal axis. The weighting ranges represented by the 8 categories are listed in the legend for Figure 17.

The vertical axis indicates insomnia scores (sum of scores for 4 types of insomniac complaints; see Procedure section). The mean values are listed in the lowest horizontal row. The row above indicates the N of persons on which the mean values are based.

VIII APPENDIX

Appendix 1

Questionnaire items dealing with sleep,
sleep disorders, and dreams

The following questions concern your experiences with dreams you have when you sleep: with all kinds of dreams, whether they are pleasant or unpleasant, exciting or frightening. Underscore either "True" or "False", depending on whether the statement applies to you or not. Use "True" whenever the statement applies to you.

1. I never remember the content of my dreams. TRUE FALSE
2. I never remember having dreamt at all. TRUE FALSE
3. How many dreams were you able to remember in the last 6 months? (Please consider even a dim memory of the dream content as "a remembered dream".) Make an approximate guess and circle the corresponding number in the following row: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 15, 20, 30, 40, 50, more than 50.

The following questions concern your experiences with nightmares. In the following text, the word nightmare means any frightening dream.

4. Have you ever had a nightmare (at least once in your life)? YES NO
5. Did you dream a nightmare at least once in the last 6 months? YES NO
(If no, go to question #9.)
6. During the last 6 months, did you wake up at least once as a consequence of a nightmare? YES NO
7. How often did you dream nightmares in the last 6 months? (Make an approximate guess and circle the corresponding number in the following row): 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 15, 20, 30, 40, 50, more often than 50 times.
8. In the last 6 months, the content of my nightmares mostly centred around (underscore the suitable and/or report briefly):

- fights, or being assaulted or killed
 - family members or close friends
 - accidents or falling down or drowning
 - other themes (report): _____
-

(If more space is needed, please continue on the back of this page.)

9. How often did you have difficulties falling asleep during the last 6 months (that were not caused by outside noise, thirst, extremes of climate, etc.)?
 Underscore the suitable response: NEVER
 ONCE OR TWICE
 NEARLY ONCE A MONTH
 NEARLY ONCE A WEEK
 MORE OFTEN
10. How often have you woken up during your sleep time in the course of the last 6 months and had difficulties falling asleep again (that were not caused by outside noise, extremes of climate, thirst, etc.)?
 Underscore the suitable response: NEVER
 ONCE OR TWICE
 NEARLY ONCE A MONTH
 NEARLY ONCE A WEEK
 MORE OFTEN
11. How often have you felt during the last 6 months that your sleep did not refresh you as it usually does (without this being caused by outside noise, thirst, extremes of climate, etc.)?
 Underscore the suitable response: NEVER
 ONCE OR TWICE
 NEARLY ONCE A MONTH
 NEARLY ONCE A WEEK
 MORE OFTEN
12. How often have you felt during the last 6 months that your sleep was not quiet, i.e., you were moving restlessly or feeling tense or speaking, etc., while asleep (and these disturbances were not caused by outside noise, thirst, extremes of climate, etc.)?
 Underscore the suitable response: NEVER
 ONCE OR TWICE
 NEARLY ONCE A MONTH
 NEARLY ONCE A WEEK
 MORE OFTEN

Appendix 2

Category of negative events in the Social
Readjustment Scale and the Life Events Inventory
and a category of positive events in the Life Events Inventory

Social Readjustment Scale: negative events

1. Death of spouse
2. Divorce
3. Marital separation
4. Jail term
5. Death of close family member
6. Personal injury or illness
8. Fired at work
13. Sex difficulties
17. Death of close friend
20. Mortgage over \$10,000
21. Foreclosure of mortgage or loan
24. Troubles with in-laws
30. Trouble with boss
37. Mortgage or loan less than \$10,000
43. Minor violations of the law

Life Events Inventory: negative events

1. You had a minor illness or injury like one needing a visit to a doctor or a couple of days off work.
2. You had a serious illness, injury or operation needing hospitalization or a month or more off work.
3. A close relative had a serious illness (from which they did not die).

6. You had a stillbirth.
7. You had an abortion or a miscarriage.
9. Your change of life (menopause) began.
12. Your wife/husband died.
13. A child of yours died.
14. A close family member died (e.g., parent, brother, etc.).
15. A close family friend or relative died (e.g., aunt, uncle, grandmother, cousin, etc.).
17. There have been increasing serious arguments with your wife/husband.
19. You have been separated from your wife/husband for more than a month because of marital difficulties.
20. You have been separated from your wife/husband for more than a month (for reasons other than marital difficulties).
23. Your wife/husband began an extramarital affair.
24. You have been divorced.
27. A child of yours married without your approval.
31. You broke off your engagement.
32. You broke off a "steady" relationship.
33. You had increasing arguments or difficulties with your fiance or steady friend.
36. You have been separated from someone important to you (other than close family members).
37. There has been a serious increase in arguments or problems with someone who lives at home (excluding wife or husband).
38. There have been serious problems with a close friend, neighbour, or relative not living at home.

- 42. You dropped out of your training program.
- 44. You failed an important exam.
- 46. Your own business failed.
- 57. You were sacked.
- 49. You were downgraded or demoted at work.
- 51. You began to have trouble or disagreements with your boss, supervisor, or fellow workers.
- 59. You had moderate financial difficulties.
- 60. You had a major financial crisis.
- 62. You were involved in a traffic accident that carried serious risk to the health or life of yourself or others.
- 63. You had minor difficulties with the police or the authorities (which has not required a court appearance; e.g., speeding fine, etc.).
- 64. You had more important problems with the police or the authorities (leading to a court appearance).
- 65. You had a jail sentence or were in prison.
- 66. You were involved in a civil law suit (e.g., divorce, debt, custody, etc.).
- 67. Something you valued or cared for greatly was stolen or lost.

Life Events Inventory: positive events

- 4. You are pregnant (with a wanted pregnancy).
- 8. You had a baby. (This item for women only.)

10. You adopted a child. (This item for women only.)
11. Your wife had a child or you adopted a child. (This item for men only.)
16. You married.
18. There has been a marked improvement in the way you and your wife/husband are getting on.
21. You have got back together again after a separation due to marital difficulties.
26. A child of yours married with your approval.
30. You became engaged or began a "steady" relationship.
35. There has been a marked improvement in the way you get on with someone close to you (excluding husband and wife).
41. You completed your training program.
50. You were promoted.
55. You had holidays for a week or more.
61. You are much better off financially.

Curriculum Vitae

Zdenek Cernovsky

Although my birthplace is Nova Bystrice (Neubystřiz) in Czechoslovakia near the Austrian border (26. January 1947), most of my elementary education followed in Ricany (a small town in the proximity of Prague) where my parents moved shortly after my birth. I also attended there a small local college (an equivalent of the German "Gymnasium") and received my B.A. in 1965. After studying chemistry for one semester (1965-1966), I changed to the Psychology Department of the Charles University of Prague (4 semesters, 1966-1968). In August 1968, I escaped Czechoslovakia, obtained political asylum in Switzerland, studied psychology at the Psychology Institute of the University of Bern (1968-1976) and obtained there the Lizentiat in psychology in 1975. My especially intensive academic contacts were with Prof. Dr. Jarg B. Bergold (presently at the Free University of Berlin) and Prof. Dr. Siegfried Frey (presently at the University of Duisburg). Subsequently, I continued my studies in psychology at the University of Zuerich. Towards the end of 1976, I was hired as a psychology lecturer by the University of Maryland (1976-1979) to teach B.A. level courses in U.S. military settings in Europe. Since my immigration to Canada in 1979, I have become a psychologist in the St. Thomas Psychiatric Hospital in Ontario (1979 - present). My professional activities include being a volunteer abstractor for Psychological Abstracts of the American

Psychological Association (abstracting articles from French and German), being a clinical instructor in the Department of Psychiatry of the University of Western Ontario, and research (published over 18 articles in scientific journals within the last three years).

